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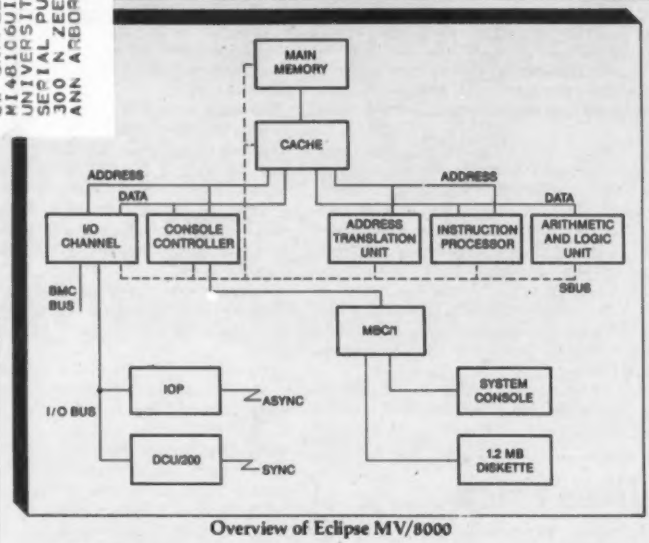

Overview of Eclipse MV/8000

DG Brings Out 32-Bit Mini More Powerful Than 4341

By Tim Scannell
CW Staff

NEW YORK — A 32-bit minicomputer capable of handling programs 32 times larger than the IBM 4341 can handle was announced here last week by Data General Corp.

Moreover, the Eclipse MV/8000 can handle programs 16 times larger than its nearest competitor — the Digital Equipment Corp. VAX-11/780 — can handle, according to DG claims.

A number of software packages for the Eclipse MV/8000, including an enhanced version of DG's Advanced Operating System (AOS) and three Ansi-standard languages, were also announced by the firm.

The Eclipse MV/8000 marks DG's first venture into the 32-bit computer field and comes after more than two years of experimentation and months of public relations and marketing "hide-and-seek," according to Rowland H. Thomas, DG vice-president of marketing. About 7% of the minicomputers shipped are currently 32-bit machines, and that number is expected to more than double by 1983, Thomas said.

Based on very large-scale integration (VLSI), the MV/8000 can simultaneously run both 16-bit and 32-bit programs written under AOS without

(Continued on Page 6).

New Wave Envisioned After 1980 Downturn

By Connie Winkler
CW Staff

CHICAGO — The new wave is coming.

This new wave, ripples of which are already here, will ride us into a far different future, DP guru James Martin proclaimed here recently.

"The 1980s will be a strange decade that economically looks chaotic, but technologically has immense potential of creating wealth," Martin said at the 1980 Deltak, Inc. DP training conference. Deltak specializes in DP training products.

The wave analogy comes not from punk rock music, but from the graph curve of the computer model of world economic history, which shows 50-year cycles of up-and-down waves since 1730. The most recent wave has been the 50-year period between the 1930s Depression and the apparent 1980 recession, he said.

This same 50-year business cycle was observed — but discounted — in the 1930s by a Russian named Kondratieff. Martin suggested that for the last seven years we have been on the downswing of the Kondratieff curve, but in the 1980s an upswing will be fired by new technologies — especially computers.

Today's downswing is indicated by the deep problem in society's infrastructure and by the fact that old industries such as petroleum and autos are not working. "The 1980s will be a decade in which we will see a major reshuffling of the cards in society. Great industries in the past will give way to new industries of the future," the guru said.

Just as the aluminum industry begrudgingly gave way to plastics, traditional methods of operating are having to make way for computers. "There are too many people in declining sectors, trying to hold on to their old jobs and not accepting new methods," according to Martin, who in 1978 authored the *The Wired Society*.

New Technologies

"The new wave of the Kondratieff cycle means a new set of technologies," Martin said. "The question is how quickly we get to the new wave without the dip becoming too dangerous."

Moving along quickly is crucial because, for the first time, the Kondratieff dip is known and understood.

Martin, with a five-screen slide and sound show, exhilarated the audience with his upbeat talk on coming technologies, including:

• *Artificial intelligence.* The goal will be circuits which mimic nature: the

(Continued on Page 8)

Productivity Pegged to Office Automation

By Marguerite Zientara
CW Staff

NEW YORK — Office automation is the key to improved white-collar productivity in the 1980s and could save U.S. business more than $300 billion per year, according to Harvey L. Poppel, senior vice-president of Booz, Allen & Hamilton, Inc.

Speaking at the National Micrographics Association's 29th Annual Conference and Exposition here recently, Poppel drew on the results of his firm's recent nationwide multiclient study of managerial and professional productivity.

Citing the recent decline in U.S. productivity levels, Poppel noted that "chronic time-wasters" in white-collar environments include trying to find and digest the "right" information, generating and disseminating documents, unnecessary travel time away from the office and expediting previous assignments and tasks.

(Continued on Page 4)

Time-Wasters

- **Conferencing: 40% to 70% (including travel time). Office automation with audio and video conferences would permit more participation and interaction with less travel, Poppel said.**
- **Personal processing or document generation: 15% to 25%. Personal computing would allow managers to edit and review word and image documents in a single step.**
- **Information retrieval: 10% to 20% (besides that which goes on in meetings). This could be performed with less effort and result in more complete, timely information through use of personal data files, internal department and company data base management systems and external data bases.**
- **Activity management: 5% to 10%. This could be improved electronically with tickler files and project and task management systems.**
- **Information transfer: 0% to 5%. This activity could also be facilitated with facsimile devices, satellite communications and other electronic mail-type systems.**

'Coordination' Seen the Look for '80s DDP

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — "Coordination" will be the dominant feature of the distributed data processing (DDP) systems introduced in the '80s, two speakers said here last week at the Federal DP Expo Conference. This new look is designed to eliminate the programming, control and hardware problems of the "first generation" DDP architectures offered throughout the '70s.

A major handicap of first-generation systems, explained John T. Ferrick, director of product marketing for Paradyne Corp. in Largo, Fla., is that they are difficult to program or difficult to operate and maintain.

He cited IBM's 8100 system as an example of the former type. Although it supports a wide variety of distributed processing applications and allows use of English language programming commands, the 8100 is not 370-compatible. Systems programmers must be extensively retrained as a result.

Further complicating this problem, Ferrick said, is that neither type of technician is available in sufficient numbers to meet the demand.

Another shortcoming of first-generation DDP systems, he added, is that they provide inadequate management and auditing control capability.

System Characteristics

In contrast, "coordinated network processing," Ferrick said, is characterized by "powerful transaction processing, inquiry facilities, ease of operation, ease of installation and efficient communications processing."

Instead of programs based on English language commands, it employs Cobol and/or PL/1, thus eliminating the need for programmer retraining. This fea-

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Editor E. Drake Lundell Jr.

Managing Editor Nancy French

Senior Editors:
Industry Marcia Blumenthal
Software Marcy Rosenberg
Communications Brad Schultz
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Features John C. Whitmarsh

Senior Writer:
Communications Phil Hirsch

Correspondents:
West Coast Jeffry Beeler
Washington, D.C. Jake Kirchner

Staff Writers Tom Henkel, Bruce Hoard, Timothy J. Scannell, Connie Winkler, Jay Woodruff, Marguerite Zientara

Chief Copy Editor Cheryl M. Gelb
Copy Editors Nancy Fleming, Catherine Marenghi, Steve Milmore, Barbara T. VanScoyoc

Photography Editor Ann Dooley

Editorial Assistants Denise Petski, Martha Taylor

Editorial Cartoonist Jim Orton

Contributors:
Education J. Daniel Couger
Taylor Reports Alan Taylor
Human Connection Jack Stone

For Sales, Circulation and Production contacts, see inside back page.

Please address all correspondence to the appropriate department at 375 Cochituate Road, Rte. 30, Framingham, Mass. 01701. Phone: (617) 879-0700. Telex: 95-1153

OTHER EDITORIAL OFFICES:

West Coast: 407 California Avenue, Suite 10, Palo Alto, California 94306. Phone: (415) 328-8064.

Washington, D.C.: 821 National Press Building, 529 14th Street N.W., Washington, D.C. 20045. Phone: (202) 347-6718.

England: Steve Burton, IDG Publishing Ltd., 140-146 Camden Street, London NW1 9PF Phone: 01-267 1201. Telex: 851 264737.

W. Germany: Eckhard Utpadel, CW Publikationens, Friedrichstrasse 31, 8000 Munich 40, Phone: (089) 34-90-61. Telex: 5215350.

Asia: Hidetsuna Sasaki, Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone: (03) 445-6101. Telex: J2424461.

Australia: Alan Power, Computerworld Pty. Ltd., 37-43 Alexander Street, Crows Nest, NSW 2065. Phone: (02) 4395133, Telex: SECCO AA25468.

Brazil: Eric Hippeau, Data News, Computerworld do Brazil, Servicos e Publicacoes Ltda., Rua Alcindo Guanabara, 25/10th floor 20031 Rio de Janeiro, RJ Brazil. Phone: (021) 240-8225. Telex: 2130838(WORD BR).

Mexico: Kevin Kelleghan, Computerworld de Mexico, Oaxaca 21-2, Colonia Roma, Mexico City 7 D.F., Phone: (905) 514-4218, (905) 514-6309.

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Not Just Way They Do It

DP Seen Changing Work People Do

By Connie Winkler
CW Staff

CHICAGO — Up until now, computers have been used to change how people do work; now they are changing what work people do, according to John Diebold, chairman of The Diebold Group, Inc., technology management consultants.

The computer has been considered capital equipment; now it has become a personal product, he told attendees at the 1980 DP training conference sponsored here recently by Deltak, Inc.

"The business community is entering a new era where management of information is pivotal. Individuals who never before had to deal with high technology are now finding it's an integral part of their jobs," Diebold said.

What's happening today with information is as far-reaching as the Industrial Revolution, he proposed. "These are the formative years for information management — organizations that seize the opportunities to sensitize people and take advantage of it will be the leading organizations in the future.

"There must be recognition on the part of organizations that information is as much a corporate resource as the work force, plant or equipment," he added.

Today, moreover, there are "massive public policy questions" surrounding information, spurred by events such as the recent terrorist attacks on computer centers in France, Diebold noted.

Initial Step

Diebold's first step for the information revolution is selling management on the value of information to its operations, and then training millions of white-collar workers to use that information, specifically the technology. Coincidentally, Deltak announced at the conference an Information Resource Management series of training materials developed by The Diebold Group.

"Organizations must learn to use information most effectively," Diebold explained. This means having the right information in the right place at the right time. To do this requires the technology to acquire the information, the policies for using the information and the structure within which to acquire the information.

"A bigger in-box is no solution for the overworked executive, yet this is the approach sometimes taken," Diebold noted.

Currently only 15% of the information in an organization is automated. This lack of attention to information is also reflected in the $70,000 average capital investment for each blue-collar worker vs. $2,000 for each white-collar worker. It is among white-collar workers that productivity is declining, Diebold noted.

"Business must apply the same management techniques to information that it has to other areas," he suggested.

The information revolution will impact the organization in numerous ways. Data collection on sales will be almost immediate so that product lives will get shorter, for example.

The public will continue to expect more of business. Because of this there needs to be a corporate information policy to define how information will be used within the organization, Diebold said.

There must also be an effort to fight what Diebold calls "information illiteracy." Users must be aware of the potential of all the information at their access and the need to be selective in what is needed for decision making.

"Trainers have to redefine their markets because technology is not 'warm and comfortable' to these workers," Diebold said.

"Approach this like an entrepreneur selling a new product to an interested, but suspecting, customer," Diebold urged.

Amdahl Hikes Prices

SUNNYVALE, Calif. — Amdahl Corp. has raised lease prices for certain models of its processors and hiked maintenance fees for all of its systems. In addition to these hikes, the firm increased the purchase price for its 470V/7A processor.

This is the third price adjustment Amdahl has made on its products in the past seven months.

Effective May 1, leases for all models of the V/7 and V/8 cost 7% more. Lease prices on all upgrades to higher performance systems jumped 13.6%.

At the same time, the firm increased maintenance costs 5% for its V/5 to V/7B models and up to 7% for its higher performance V/7 and V/8 models.

Although the firm did not raise purchase prices across the board, it did hike the price of the V/7A by $100,000, or 12.6%. This increase aligns the V/7A with the price/performance level of Amdahl's other processors, a spokesman said.

With the latest round of increases, Amdahl has raised its lease prices cumulatively 13.7% to 22.6% since January [CW, Jan. 21].

While the hikes were partly attributed to continuing inflationary pressures, the spokesman also said demand has been high for the firm's products.

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Will the world's best DOS sort go to the Olympics?

(Nyet! SyncSort DOS will hold its own games!)

Call (201) 568-9700

Be a "hostperson."

There's some good news and some bad news today.

The bad news is that no member of the SyncSort team will attend the summer Olympic Games in Moscow. Like most of the free world's great performers, we'll just have to boycott. (Or should we say personcott?)

The good news is that we'll sponsor our own "Free World Sorting Olympics." And we'd like you to volunteer to be a hostperson. Here's what you'll have to do if you happen to be a DOS/VS or DOS/VSE user:

First, pick up the telephone and call us. Quicker than you can say "Leonid Brezhnev," we'll dispatch SyncSort DOS to your shop.

When it arrives, we suggest you put it to work immediately. Match it against your present sort—or any sort program you have in mind—on the toughest and most grueling sorting events you can think of. Then whip out your stopwatch and check the results.

Finally, award the medals. We think you'll find that you'll be hanging at least three golds on SyncSort DOS:

- **Gold for Speed and Endurance.** Compared to any one of IBM's DOS sorts—the most likely challengers—SyncSort DOS gets there first with less huff-and-puff. Look for resource savings like this:
  - 20-40% in Elapsed Time;
  - 10-50% in Overhead CPU Time;
  - 15-30% in Total CPU Time;
  - 30-50% in Disk Space Utilization;
  - 10-40% in SIOs.
- **Gold for Hurdling Programmer Problems.** SyncSort is always "most popular" with applications programmers because it's loaded with features that reduce coding. Things like INCLUDE/OMIT, SUM, OUTREC, and a couple of slick new features that make copying from one file to another very, very easy.
- **Gold for Systems Sortsmanship.** SyncSort DOS never hassles non-sorts in the mix. One reason is Storage Auto Option—a new concept that manages your system's real storage in accordance with your overall priorities. Another is PARM-EXIT, which dynamically modifies your sort parameters.

After you've awarded the foregoing medals, lower the flag, put out the Olympic sorting flame, and say goodbye to all those sorting contestants from so many parts of the world.

All of them except SyncSort DOS. With the price of gold going up every day, hold on to it!

OVERSEAS REPRESENTATIVES—

Düsseldorf: SyncSort Technology GmbH, Tel.: 0211-480351
Johannesburg: Computing Benefits Ltd., 46-2083
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Reading (UK): SyncSort Technology Ltd., 44-0734-481919
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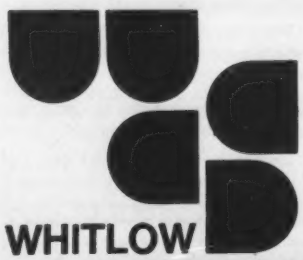

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IBM Expected to 'Stretch' 30 Series

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Predicting that IBM's anticipated H series of mainframes will not be introduced until at least the first quarter of next year, Charles P. Lecht, president of Advanced Computer Techniques Corp. (ACT), said last week IBM will "stretch" its 30 series to fill the gap.

According to the scenario presented by Lecht at the Federal DP Expo, the recently introduced 3033N — which he called "a crippled 3033 processor" — provides a new base for later migration to the predicted 3034 and 3035. The objective of the 3033N is to stimulate conversions from rental and lease to purchase in 1980, he said.

The 3031E, which he predicted with "50% probability," would be simply a multiprocessor version of the 3031 which was previously not announced. He described the 3031E as an enhanced, "tightly coupled" multiprocessor that will offer a field upgrade option at a memory price targeted at $500,000 per million of instructions per second (Mips).

The 3031E would provide a migration path for installed 3031 customers while increasing IBM revenues by 20%. "The 3031E would be attractive to the 3031 uniprocessor users as their installed machines would now be field-upgradable," Lecht said.

The 3034, which he predicted with "70% probability," would be an "engineering-enhanced" 3033 (up to 7 Mips capability, according to ACT projections), while the 3035 would represent multiprocessor/Attached Processor versions.

The 3034 would offer a migration path for 3033 users while increasing IBM revenues and purchase levels, according to Lecht, and would be a solution to Amdahl Corp. 470V/8 and other competition.

Other 'Stretch' Features

All the "stretch" models should also have improved I/O channel bandwidth, new disk attachment via the 3880 system extension microcoded performance assistance and a new MVS release, Lecht added.

Other features of the ACT prediction included a 4351 that would be announced after the 3031E as a field-upgrade kit (additional cache, etc.) for current 4341 installations, with later deliveries for those sites without 4341s installed.

Also, the availability of the 3370 and/or "Whitney" disks via the enhanced 3880 intelligent controller "would further sweeten the [30 series] stretch product offerings and cause many customers to recognize the [30 series] longer life cycle and thus convert their rental/lease credits to purchase in 1980," he said.

Finally, Lecht said "a significantly enhanced new release of MVS with added functions, that will be more fully revealed when the H series is available, would complete the stretch package."

To Hide Inventory Thefts

Squibb DPer Convicted of Rigging System

By Bruce Hoard
CW Staff

NEWARK, N.J. — Matthew De Filippo, 34, of Reading, Mass., was convicted of three counts of wire fraud in U.S. district court here last week after admitting he rigged E.R. Squibb & Sons, Inc. computers to conceal the theft of pharmaceutical products from two Squibb distribution centers.

De Filippo was originally indicted on 10 counts of the same charge and accused of being responsible for the loss of $1 million in prescription drugs such as foot cream and medicine for high blood pressure [CW, March 17].

De Filippo masterminded the scheme while employed as a computer operator in Squibb's Burlington, Mass., distribution center from 1973 to 1977, according to Assistant U.S. Attorney Mary Ann Murphy. During that time, he took goods weekly and kept track of product numbers and quantities taken, he admitted.

In order to cover up the loss, he billed two Squibb house accounts normally used to cover inventory disbursement that did not result in billings to customers, such as samples and exchanges. He issued a debit invoice to cover the removal of products from stock and then offset it with a credit to the same account so there would be a "washout" on the monthly statement.

De Filippo admitted transmitting such false data over dial-up lines between Burlington and the Squibb central computer center in East Brunswick, N.J., on July 17, and Aug. 5, 1975. He did not say who received the stolen goods.

Scheme Resumed

After being transferred to the company's Somerset, N.J., center and promoted to computer operations manager, De Filippo resumed the rip-off scheme in 1978 and was fired later that year.

In the early hours of July 28, he said, he transmitted a false invoice over dial-up lines between Somerset and Burlington to clear the way for a shipment of drugs with a retail value of more than $8,000 to be sent to James Brudnick, Inc., a wholesale drug warehouse in Malden, Mass. A few minutes after the transmission, when he was sure the Burlington computer had printed the invoice, he ordered the invoice killed at Somerset so Squibb would have no record of the shipment.

De Filippo will be sentenced on June 9 and faces a maximum fine of $3,000 and 15 years in prison.

Office Automation Could Save $300 Billion

(Continued from Page 1)

Such misused time, he noted, does not allow professional personnel to analyze what they are doing, make long-range plans, participate in decision making or update their professional skills. These deficiencies, in turn, result in decreased revenue generation, service delivery and cost containment for their organizations.

Survival in 1980s

Claiming further that business must boost its effectiveness in order to survive the 1980s, Poppel noted that U.S. companies spent $800 billion in 1979 to support office-based white-collar workers. Of that amount, $78 billion went to managers, $21 billion to other professionals and $30 billion to clerical workers.

"And if we hadn't been using computers for the past 20 years," he noted, "the figure for clerical workers would be more."

Poppel maintained that offices are the nerve centers of business and that office automation can improve the quality and productivity of these nerve centers. He suggested that such higher quality would be manifested in more substantive work done more quickly and more accurately.

Furthermore, the amount of input needed for certain output would be reduced and the quality of the individual's work life would improve with greater satisfaction, fewer frustrations, more participatory opportunities and less "ugly" travel, Poppel claimed.

Nonautomated Solutions

Besides machine technology, several nonautomated solutions are needed, according to Poppel, including a clear redefinition of responsibilities, balanced work allocation, optimum sizing and structuring of the support organization, "flex" time, tight meeting disciplines and personnel "of quality and motivation."

According to Poppel's "unifying theory of office automation," managers will have to view the office environment differently than they do today by always considering the possible effects of one type of automated office activity on the other types.

For example, within the five activity categories Poppel listed, there are several contending ways to accomplish the same thing, one of which may be more versatile and therefore also useful in other areas.

Furthermore, much of the demand on the new systems will be "new demand" arising from new capabilities,

CW Photo by M. Zientara

Harvey L. Poppel

Poppel said. For example, additional meetings will be made possible by teleconferencing and information will be available that previously "you wouldn't even try to find."

All of this adds up to potential savings to U.S. business of more than $300 billion yearly in terms of greater productivity. "However, there is no single office automation solution," Poppel said, "and making the changes will involve a long, tough battle."

The first step is to "scope the issues" — determine the environment's present status and future needs — and then organize for the planning stage by designating responsibility for the office automation, Poppel recommended.

Then comes the actual planning, followed by an evolutionary path toward implementation using "bridge subsystems" to help gain user acceptance. A manager who started such a phased-in implementation now could have a multifunction integrated system beyond 1982, Poppel concluded.

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But Sees MVS Update This Summer

Lecht Predicts Delay of IBM H Series Until '81

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The long-awaited IBM H series processors will be delayed until 1981 because of "technical, logistic and business planning considerations," Charles P. Lecht, president of Advanced Computer Techniques Corp. (ACT), said here last week.

Delivering the Federal DP Expo's keynote address, Lecht predicted that a "stretched" 30 series will be introduced by this summer as "end-of-life kickers" to maintain IBM's industry position until the H series can be introduced (see story on Page 4).

A well-known IBM watcher and futurist, Lecht presented the conference with a wide-ranging update of ACT reflections on upcoming IBM offerings:

- A "major new release" of MVS should be out this summer, representing "a rewrite of MVS to support a wider address space and predicted H series functions," Lecht said.
- The "Whitney" or "Coronado" disk, offering 1.2G bytes per drive, will be part of IBM's package to stimulate conversion to the 30 series systems.
- The next E series model, 4331-II or 4336, has slipped by its expected introduction date, and a 4351 or 4361 should also be introduced by the end of this summer. The 4351 should provide 1.3 to 1.4 millions of instructions per second (Mips), while the 4361 may reach 2.5 Mips. The top end of the E series is being extended to about 4 Mips.
- Additional microcoded "assists" (accelerators) are planned for all E series models this year. Those options will be separately priced, according to Lecht.
- Another 4300 rental/lease price rise is expected by the end of the third quarter. The increase is estimated in the 5% to 10% range.
- IMS/VS will evolve over time and include a relational data base engine by 1983; it will also support the proposed Codasyl standard. Sequal, not System/R, will be the basis for the relational capability. A microcoded implementation of DL/1 is part of the plan, Lecht said.

'Stretch' Plan

Turning to the predicted 30 series "stretch" plan, Lecht said "the H series has again encountered some serious but temporary technical, logistic and business planning problems which are expected to delay the announcement" until the first quarter of 1981.

"Although H series design and preproduction models have successfully passed their reviews, the product line could not be certified for manufacturing mass production in time for the original 1981 introduction," he said.

The stretch or "fall back plan, if successful, would enable IBM to maintain its competitive position and earnings growth during the difficult 1980-1981 period and at the same time buy time to ensure the successful launching of some of the H series, G series and Sierra series models," he said.

Assessing the impact of the H series delay, Lecht said it should improve IBM's 1980 earnings at the expense of 1981. The predicted stretch processors all represent higher priced mainframes compared with their predecessors at current levels, he explained.

ACT's estimates assume an increase on an if-sold value basis of 15% to 25%, with greater increases in performance. "However," Lecht continued, "the new price/performance curve of approximately $500,000 per Mips, which the stretched 30 series represents (vs. $650,000 per Mips for the original 30 series), forces a higher curve for the H series and other successor lines.

CW at Federal Expo

"Thus the 'end-of-life kicker' for the current series would impact planned price performance targets set earlier for other development programs," he concluded.

Lecht said it would be "far better for IBM to introduce the new technology and new function product line now and take its earnings lumps, rather than extend an aging technology.

"But IBM is not in complete control of its destiny in this regard," according to Lecht. He noted the present weak-

(Continued on Page 6)

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DG Unveils 32-Bit Mini

(Continued from Page 1)

modification or "mode bit" emulation, a spokesman said. While it handles any software geared for previous Eclipse CPUs, the MV/8000 has 4.3G bytes of virtual address space — more than four times that of the M600, DG's largest 16-bit processor.

To facilitate memory management, the virtual address space is broken up into eight self-contained 512K-byte segments, the spokesman explained.

Four Subsystems

The MV/8000 consists of four subsystems: the CPU, memory, a system control processor (SCP) and an independent I/O system with its own instruction set and 64K bytes of local memory.

The CPU is implemented in four stages and reportedly allows instructions to be concurrently fetched, decoded and executed. The CPU also has a 1K-byte instruction cache that incorporates a look-ahead/look-back feature and random access memory-based microsequencer that holds the system's microcode.

Because the CPU utilizes program array logic and VLSI technology, the entire unit consists of five circuit boards, about one-fifth the number used in its competitors, the spokesman noted.

The 32-bit system's memory is supplied in 256K-byte modules, up to 2M bytes of main memory. The modules are organized into 64K-byte double words. Each module is four-way interleaved and contains embedded error correction and detection facilities, according to DG.

The MV/8000 transfers data between the memory modules and the I/O system via a 16K-byte cache that acts as a high-speed buffer, fielding information at a rate of 36.4M byte/sec. This transfer rate is possible because memory operations overlap, allowing four double-words to be transferred for each access, the spokesman explained.

Further, the cache transfers data throughout the remainder of the 32-bit system at a rate of 16 bytes in 550 nsec for write operations and 440 nsec for read functions.

The system's memory also includes a cache-based hardware Address Translation Unit (ATU) that acts as a hardware accelerator for the memory's paging system. The ATU maintains a table of up to 256 address translations and generates modified and reference bit signals, reducing the number of disk accesses required for a program execution.

System Control Processor

The SCP is managed by a 32K-byte Micronova processor and has a diskette-based operating system resident on a 1.26M-byte drive. The diskette drive also stores the 32-bit system's microcode and a diagnostic microcode and serves as a log for any system problems detected by the SCP.

Operators can use the SCP as a soft console and load or modify main memory and microcode; alternately, they can single-step through a program instruction by instruction.

Since the MV/8000's control store is in alterable memory on the diskette, microcodes can be updated without replacing any boards or changing programmable read-only memory circuits. Like the SCP, the I/O system is virtually an independent processor that consists of a high-speed burst multiplexer channel (BMC), a data channel and the 64K-byte I/O processor (IOP) — all under the control of a channel board, DG noted.

I/O data is transferred via the BMC, data channel or IOP through the computer's cache, relieving the host CPU. The BMC provides a direct communications path between memory and peripherals, transferring data blocks at rates up to 16.16M byte/sec. The data channel is aimed at slower peripherals and operates at rates up to 2.27M byte/sec, the spokesman said.

The IOP functions with the Eclipse instruction set. It processes and buffers data from low-speed peripherals such as CRTs and printer terminals, card readers and digital plotters.

The device also acts as a front-end processor for the MV/8000, checking data for errors and sending it to the cache and then to main memory one logical record at a time, he said.

As a front end, the IOP allows users to hook up to 128 terminals to the MV/8000, he added. A basic MV/8000 system with 512K bytes of memory, battery backup, tape drive and 96M-byte disk costs $153,150 without software. A medium-scale system with the same amount of memory but with 24 additional CRT terminals, a 190M-byte disk, a printer, terminal interface and software licenses for AOS/VS, the enhanced operating system, and Fortran 77 sells for $257,750.

A full-blown 32-bit system with 2M bytes of memory, three 16-line terminal interfaces, 64 additional terminals, four 277M-byte disks, two tape drives, a 900 line/min printer and software licenses for AOS/VS, Infos II, the Transaction Processing Monitor System, Cobol, Info Query, and AOS/VS Sort/Merge costs $504,700.

DG is located at Rte. 9 in Westboro, Mass. 01581.

Latest Eclipse Gets Enhanced AOS

By Tim Scannell
CW Staff

NEW YORK — The heart of Data General Corp.'s 32-bit flagship — the Eclipse MV/8000 introduced here last week — is an enhanced version of DG's Advanced Operating System (AOS) that manages resources for more than 100 users and allows the simultaneous execution of 16-bit and 32-bit programs.

AOS/VS, a multiprogramming operating system, controls concurrent time-sharing, batch and on-line operations. The software operates on a demand paged basis, using 2K-byte pages, and transfers sections of data only as they are needed by the main memory, according to a spokesman.

In addition to AOS/VS, the vendor also introduced three 32-bit Ansi-standard languages for the MV/8000: AOS/VS Fortran 77, PL/I and Basic. AOS/VS Fortran 77, for scientific applications, implements the full Ansi Fortran X3.9-78 standard and the ISA-SG1.1 standard, offering structured programming, expanded I/O and character processing and manipulation.

AOS/VS PL/I conforms to the Ansi general-purpose subset standard PL/I language X3.74; AOS/VS Basic includes extensive diagnostics and user-oriented features, the spokesman said. AOS/VS Basic is a "substantial superset" of the Ansi Basic standard X3.60-1978 and has source-level debugging and decimal arithmetic, he added.

In addition to DG's three 32-bit languages, AOS/VS supports Masm, a 32-bit assembler language, and has a report utility that gives control over resource utilization.

While AOS/VS can run Cobol, but in a 16-bit mode, DG claimed it operates 20% to 30% faster on its 32-bit machine than on its top-of-the-line M600 minicomputer. Other commercial software such as RPG-II, the DG/DBMS data base management system and the firm's recently announced Transaction Processing Monitor System (TPMS) can run on the MV/8000 as well, the spokesman noted.

The firm also introduced a 32-bit native debugging language for programs written in Fortran and PL/I.

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Lecht Predicts H Series Delay

(Continued from Page 5)

ness of the U.S. economy, high inflation the fact that competition from Amdahl Corp./Storage Technology Corp. and the Japanese is forcing "preemptive action."

At the same time, integrated circuit yields and manufacturing production are inadequate, he said, suggesting "IBM needs higher [30 series] purchase levels to fuel its future growth."

Reason for Forecast

As for the H series itself, ACT's "preliminary forecast" assumes the first three models in the series "cannot be sufficiently improved on the performance/cost curve and that, as a result, these lower end H series models may not make it to the marketplace," Lecht said.

He explained this forecast by suggesting "the likely availability" of some of the G series and Sierra series models in the 1982-1983 timeframe.

ACT has also learned the E series will be extended upward to about the 4 Mips level. "We believe the E6 is really an MP [multiprocessor] or AP [Attached Processor] version of the E5 (43617), which is expected to reach up to 2.5 Mips."

As National Election Approaches

New Questions Raised in ACM Policy Dispute

By Jeffry Beeler
CW West Coast Bureau

As the Association for Computing Machinery (ACM) approaches its May 13 national election, additional questions are being raised about whether several top ACM officeholders exceeded their authority while trying to resolve a compaign policy dispute with one of the association's candidates.

The first sign that the ACM national election had become mired in controversy appeared early last month when Dr. Herbert R.J. Grosch, an ACM Council member seeking another term in office, accused the society's Nominating Committee chairman of "censoring" his 200-word campaign statement, which appears in the ballot material each voting member receives in the mail [CW, April 7].

Since then, the number of concerns being voiced about ACM's nominating and election procedures has grown to include a number of side issues. These focus on the question of whether the revisions — regardless of how they are characterized — are justifiable under ACM's policies and bylaws.

Most of the election controversy's most recent issues involve fine points of ACM constitutional law, and the question of whether the Executive Committee violated or acted in accordance with that law seems largely a matter of personal interpretation.

Editing Authority

One of the most hotly contested points in the whole ACM election flap concerns the issue of whether Nominating Committee Chairman Smith Dorsey acted within his authority when he cut Grosch's ballot statement by 100 words, or a full 50%.

In a brief footnote accompanying Grosch's abbreviated ballot statement, Dorsey claimed his editing authority was delegated to him by ACM Council during its regularly scheduled meeting in Detroit last Nov. 1.

But both Grosch and Kathleen Wagner, a candidate for ACM secretary, dispute Dorsey's contention. On Oct. 30, the two recalled, ACM Council did indeed vote to give the Nominating Committee chairman authority to edit ballot statements for compliance with the association's past practices and policies.

Straw Ballot

Coming as it did during the meeting's "information" session, however, the vote qualified as a straw ballot only and therefore was never considered binding. When the editing question finally did come up for a formal vote two days later, Council moved to table the whole matter and return to original election procedures, Grosch and Wagner said.

Dorsey could not be reached last week for comment, but ACM Vice-President Peter Denning — one of four candidates currently running for association president — challenged the suggestion that the Nominating Committee chairman had altered Grosch's ballot statement without Council's explicit authorization.

Council tabled the authority-to-edit motion, he explained, only because it wearied of dealing with the issue and no doubt would have passed the resolution formally if an opportunity for an official vote had ever arisen on Nov. 1.

New Question

Another new question that has arisen recently during the ACM election dispute concerns the validity of a Council mail vote that the Executive Committee arranged last March 18 to honor Grosch's request for an appeal of his ballot statement revisions. The mail ballot's legality is questionable, Grosch and Wagner agreed, because the Executive Committee requested the vote on March 13 with just five days of notice, only half as much leadtime as is called for in the ACM's constitution.

Denning, however, interprets the society's bylaws somewhat differently from Grosch and Wagner. The 10-day-notice requirement, he said, applies only to Council meetings that take place face-to-face, not to ones in which business is transacted long distance by telephone or mail. Besides, he added, the Executive Committee gave Council members the option to postpone the vote until March 24 — and no one chose to exercise the option.

Grosch and Wagner have also questioned the mail ballot's validity on a second score. Under the ACM constitution, they agreed, the Executive Committee can legally transact business only after all three of its members have been given "due notice" of a meeting, and at the time the mail-ballot was being arranged, one of the trio was traveling in Asia and could not be reached.

Denning, for his part, denied the charge that the Executive Committee exceeded its authority or violated the ACM constitution in requesting the March 18 Council vote. The requirement for due notice, he said, refers only to Executive Committee meetings with a formal agenda, not to simple "management decisions where the committee is merely acting on a council member's request for an appeal."

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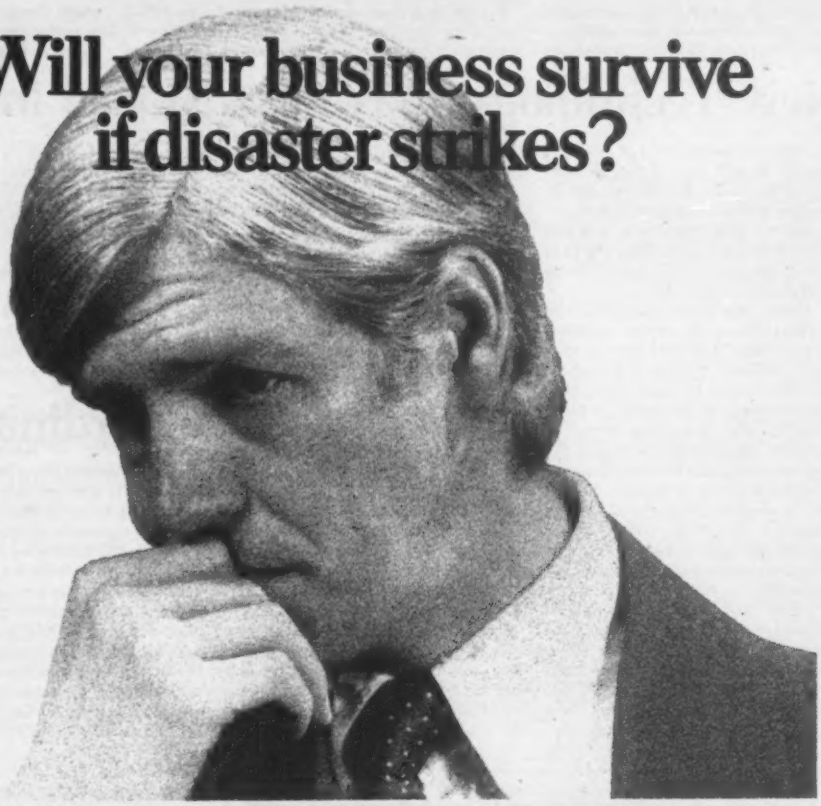

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Savings for Large Mailers

USPS Plans Incentives to Push Nine-Digit Zip

By Jay Woodruff
CW Staff

WASHINGTON, D.C. — The U.S. Postal Service (USPS) will offer large mailers rate incentives to use its nine-digit Zip Code, slated to go into effect next February.

While no specific rate savings were announced, Postmaster General William F. Bolger said the "incentives" would be given to large mailers that use all nine digits and make them machine-readable for the $600 million worth of optical character recognition and bar code recognition equipment the post office is acquiring to update its mail-sorting system.

Bolger's announcement, which came April 23 before the Subcommittee on Postal Service of the House of Representatives Appropriations Committee, leaves unclear how far the Postal Service will cut rates for nine-digit mailers in light of another rate proposal made last month. In it, the USPS asked for a rate hike for first class mail from 15 cents to 20 cents, while offering a 4-cent reduction for full five-digit presorting by mailers.

Incentives Predicted

Bolger's announcement came as no surprise to Sig Guthman, chairman of the Postal Affairs Committee of the Envelope Mailers Association and president of the Atlantic Envelope Co. Guthman had predicted shortly before the announcement, that rates would "eventually" be lowered because "it has been the practice of the USPS to announce an incentive program for those mailers who do some of the sorting work."

A large East Coast mailer who asked not to be identified had also predicted incentives would be forthcoming. "Logic tells you that if you spend a quarter of a million dollars to switch to the nine-digit code, there would have to be an incentive to do so. Otherwise, why not stay with the carrier route sortation procedures used now?" he queried.

But there are other reasons for making the change, the mailer said.

First, mail should be delivered faster because sorting machines are capable of processing mail faster than their human counterparts. Errors should be reduced, too, especially if the USPS' scanning systems are as accurate as it has said.

Once the nine-digit code comes into common use, rate increases should either be less dramatic or they will occur less often. Since the Postal Service will be able to handle the same volume of mail with less manpower, and because manpower comprises approximately 90% of the postal budget, "This means the post office will process more mail at lower cost," the mailer said.

But consideration of mailing costs and faster deliveries aside, one of the biggest advantages of the new code may be the mailers' ability to send mail with greater precision.

For now, a mailer who wants to reach specific homes in a carrier route also gets his mail delivered to every other address on the route. But with the nine-digit Zip Code, a business mailer, for example, can segregate mailings to businesses only or to consumers on the route, the mailer explained.

Mailings can be targeted more specifically with the carrier route programs of the future, he predicted, and each piece in the mailing will be more effective because it reaches only those groups of people one wishes to reach.

But while these benefits are of use to the large mailers, there is far less incentive for the small mailer — mailing about 1,000 pieces of mail a month — to spend the time and money on a conversion of five-digit listings, according to the large mailer.

For one thing, it would be an expensive and time-consuming trial to run so few names against the 80 to 100 1,600 bit/in. tapes that are expected to comprise the nine-digit listings for the entire country. If small mailers decided to update to the nine-digit code, they might be better off hand-matching the five-digit codes and addresses to the nine-digit codes, he advised.

New Technology Wave Envisioned in '80s

(Continued from Page 1)

brain of an ant, for instance. Chess-playing machines are the first miniscule sign of this, Martin explained.

• *Robots.* Closely related to artificial intelligence, robotic machines will continue to grow at 60% a year through the 1980s, he predicted.

• *Fusion.* In the long run it will be the most powerful energy resource. The effort begun in 1961 to put a man on the moon in 1970 was no harder than what has to be done now to tap fusion, according to Martin, who is also enthusiastic about solar energy.

• *Space industry.* By the end of the 1980s we will build factories in space for manufacturing semiconductors in pure, vacuum environments. Many companies including foreign firms have already booked space for research on upcoming space shuttle flights, the guru noted.

• *Ocean and hydroponics (food-growing) industries.* By the year 2000, world population will be six billion and new food supplies will be crucial.

• *Genetic engineering.* Rapidly decaying plants may provide new sources of alcohol as well as already-recognized substances such as interferon for fighting cancer.

"If we can identify the technologies that will cause this [Kondratieff] curve to continue upwards, there will be many millionaires to be made," Martin said.

New Wave Industries

Already identified industries launching the new wave include semiconductors, where Martin predicted greater integration of circuits on silicon up to as many as 10 million. "We are a very long way from the natural barriers of physics," he added.

Because of the success of the Japanese 256K chip, which is about two years ahead of U.S. manufactured chips, U.S. semiconductor growth will require a terrific dose of capital into production. "This is the most critical area in American technology today," the Oxford-trained physicist said.

Optical fibers capable of transmitting billions of bits per second is the second area Martin predicts will boom. He foresees our telecommunications highways, now primarily copper wires, will be totally revamped with optical fibers.

In yet a third industry, the data processing guru predicted video disks will become a main storage medium and open up a whole new storage technology.

With any new technology, all it takes is that one last invention to make the whole feasible. He recited contemporaneous statements pooh-poohing new discoveries or calling them "interesting, but commercially useless."

Coordination to Mark DDP

(Continued from Page 1)

ture reflects a recognition that any attempt to give full programming capability to remote users jeopardizes the system's auditability by making software changes easier to make and hence more difficult to control, he said.

Coordinated network processing is more flexible than DDP systems introduced in the '70s, according to Ferrick. For example, this architecture can put control at the central or remote site — or possibly in either place for different applications — depending on the user's need.

The new DDP architecture also makes systems easier to expand, maintain and reconfigure, he maintained. One result is that programs resident at remote sites can be debugged from the central site.

Some implementations of coordinated network processing separate remote communications from remote DP. This permits better use of the latter facilities because they do not have to be involved in transactions between a local terminal and the central site or another remote site, Ferrick pointed out.

Moreover, if the remote communications processor goes down, the terminal can still communicate with a computer at the same location.

'Standard for the '80s'

IBM, however, has chosen a different architecture, according to Dr. Jared Anderson, president of Two Pi Corp., Santa Clara, Calif. He was referring to the latest verions of the VM370 operating system, which includes a Remote Spooling and Communications Subsystem (RSCS) networking module and thus combines DP and communication functions within each DDP nodal computer, rather than separating them.

IBM has incorporated this scheme into its Sun network, an internal DDP system interconnecting more than 200 computers at sites in Europe, the continental U.S. and Hawaii, Anderson reported.

VM370, in its newly upgraded form, will become the standard for DDP systems introduced in the '80s, he contended. The reasons are several: IBM developed it; it costs substantially less than its predecessors; and it supports a minicomputer (the IBM 4300) rather than a larger processor, thus further reducing the user's investment.

A key benefit of the VM370 operating system, according to Anderson, is that it can be incorporated easily into any existing 370 configuration, as well as into compatible systems offered by non-IBMers — for example, the Amdahl Corp. 470V/7 and Two Pi V332.

The VM370 with RSCS networking is also more cost-effective for distributed applications than IBM's Systems Network Architecture, he added. In addition, it more easily transfers programs and jobs from one host to another. This capability permits job queues to be evened out and makes such specialized equipment as high-speed laser printers more accessible to network users not directly connected to the site where that specialized equipment is installed, Anderson said.

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Consultant Says Firms Like Fast DP Turnover

By Connie Winkler
CW Staff

CHICAGO — The turnover melee in data processing may be inevitable — and some employers seem to want it that way, J. Boyd, an employment consultant for DP professionals, told a session at the Deltek, Inc. 1980 training conference here.

According to Boyd, the recent fast and frequent turnover:

• Produces cross-pollinization of ideas that work between companies.

• Increases the productivity of these "in flight" employees — they want to learn all they can at the new location because they know they are only going to be there a short time.

• Is condoned by employers who came to Boyd saying the employee for whom they are looking probably has worked at several locations previously.

This situation has spawned the neon signs offering a 20 percent pay increase just to move to the company down the road, what Boyd called "placements by sundown."

The problem will be exacerbated through the 1980s by the shortage of DP professionals, according to Boyd, who is with the Wellesley, Mass., firm of Romac & Associates. He agreed with a figure presented earlier in the conference that there will be a 25% shortfall of DP professionals through the decade.

Reason for Leaving

From his talks with former employees, Boyd has learned the most persistent reason people leave is they feel promises made to them when they were hired have been broken. The promises can have to do with anything from pay to training to advancement.

"Promises have to be balanced against the employers' ability to make them come true," Boyd said.

Instead of looking at why people leave, however, the former IBM salesman suggested the best way to keep people is to look at why they stay, as the Harvard Business School did.

Boyd also suggested multiple career paths so employees do not necessarily have to follow prescribed steps to get to a certain job.

Although it is almost never possible, Boyd suggested that a senior programmer, for instance, should not need to become a systems analyst to earn more money if the person is truly a good programmer and not interested in systems work. "Go with the flow on people's motivation," Boyd said. "Career paths don't have to be like Pert charts."

Employees may have to make compromises on salary, but in most cases they are willing to do it, he added.

The irony is that this holding pattern for more money is what people do when they keep the same job but switch employers, Boyd said.

Boyd generally recommended more honest, open discussion between employees and employers, but suggested that will be a long time coming.

Answering questions, he said:

• Companies offer increases within the Administration's wage and price guidelines to employees whom they don't really care if they keep.

• Counter-offers by the present employer when the employee threatens to leave are only Band-Aids on a bigger problem. "If the employee can be bribed to stay, you've got a clear picture of the motivation the individual has to work there. It's just the money, and someone else will come up with more money."

The employee also feels the employer only values his experience when the employee threatens to leave.

• Employers are dealing with the employee shortfall dearly by using DP services — what Boyd called "rent-a-programmer" and are also installing additional software packages.

Phone Company Gets Icy Stare For Coding Error

ABILENE, Texas — A mistake in a Yellow Pages listing that placed a local funeral home under "Frozen Foods — Wholesale" has not gone without notice in this west Texas city.

More than 70,000 phone books were distributed early last month and every one contained the error. It was caused, Southwestern Bell Telephone Co. officials think, by a data entry error in coding that put the Elliott-Hamil Funeral Home outside its proper location.

Southwestern Bell has been using computers for several years now to assemble the Yellow Pages section, a spokeswoman here said, and is "quite proud of its low error rate" — less than 1%.

"Unfortunately, when something like this happens, no one ever hears that our error rate is low and that we are trying to lessen it each year," she said. "I don't think this happens frequently, but when it does, it gets played up to the point where one would get the idea that this happens all the time — and it doesn't.

The phone company is liable only for the cost of the advertisement, which means that the funeral home won't have to pay to be listed under "Frozen Foods."

This mistake may be ironic. However, the owners of the funeral home also own Elliott Insurance Co., which was listed — you guessed it — under "Funeral Homes."

ASM Meeting Starts Sunday

NEW ORLEANS — How social changes, technological developments and tighter money supplies affect computer systems will be the subject of a three-day conference here at the Marriott Hotel May 11-14.

Sponsored by the Association for Systems Management (ASM), the conference will focus on the future of organizations and systems.

Twenty-eight seminars, on topics from clear business writing to telecommunications in the '80s, will be offered. The course costs $295 for ASM members and $395 for nonmembers, ASM said from 24587 Bagley Road, Cleveland, Ohio 44138.

How to increase programmer productivity in a COBOL shop

(for less than you thought possible)

When you think of it, programmer training is pretty haphazard. After a few language courses, a programmer goes into on-the-job training. Which usually means, he's on his own. So if he ever learns to write efficient, easy-to-read, easy-to-maintain programs, it's largely through his own doing.

A few weeks ago, for example, I looked through the listings of some COBOL programs written by a senior programmer in a medium-sized System/370 installation. To my surprise, the programs were poorly written. They were written in an almost impossible to understand style; there was no structure to them; and there were many inefficient coding practices throughout.

My consultant friend tells me that this isn't unusual at all. In addition, he says all too many COBOL programmers are ineffective when it comes to testing and debugging. And they are dreadfully slow when they have to write unfamiliar routines.

4 ways we can help

First, we have a 2-volume COBOL course that is a programmer's guide extraordinaire. Because it illustrates and explains all the major types of routines that an applications programmer is likely to write, it can save hours of research time. Not to mention coding, compiling, and debugging time.

Second, we have two books designed for experienced COBOL programmers—a textbook and a cookbook—that present a complete system for developing *structured* programs. The methods presented in these books make any step of program development more efficient. But they're especially helpful in the critical area of testing and debugging.

Third, we have two System/360-370 assembler language books (one for DOS, one for OS). These books are so effective that hundreds of programmers have learned BAL from them without any outside assistance. So if you have programmers that can't debug by using assembler language output, one of these books is a must.

Fourth, all six of these books are loaded with down-to-earth, practical, real-world advice. It's like being able to talk to the lead programmer without interrupting his work. As a result, our books can provide job enrichment at the same time they increase programmer productivity.

Practical, how-to, programmers' guides

Although thousands of companies have bought our books for inhouse training, we believe they're equally good as programmers' guides.

In fact, we believe every System/360-370 installation can profit by having at least one copy of the appropriate assembler language book along with the complete set of four COBOL books. At our low prices, you don't need much programmer improvement to justify the investment. And in most shops, there's so much to gain.

For instance, the COBOL language books show: how to develop programs that use sequential files on tape or direct-access devices; how to improve processing efficiency by using SET and SEARCH for table handling; how to write and call subprograms; how to improve coding efficiency by using the source-statement library; how to create and process indexed files; and how to write COBOL sort programs. These books cover DOS and OS considerations as well as 68 and 74 ANSI standards.

In contrast, the structured-programming text covers subjects like: how to design programs so they are easy to code, debug, and maintain; how to use documentation and code from an old program when developing a new one; and how to increase productivity with techniques like structured walkthroughs. The cookbook gives standards for a structured COBOL shop, so a programmer can easily find the answers to program-development questions. And it also gives complete documentation for four business programs...documentation that can save a programmer many hours of effort when developing a new program.

As for the assembler language books, they include subjects like: how to write a subprogram that can be linked to a COBOL program; how to write a routine for bit manipulation or code translation when COBOL is inefficient; how and when to use assembler language for processing ISAM or direct files. And always, these books give that extra level of understanding that can turn an average programmer into an outstanding one.

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Management Pros Separated From Amateurs

By Connie Winkler
CW Staff

CHICAGO — The difference between the amateur and the professional, expert William Oncken said, is that the amateur does the difficult with difficulty and the professional does the difficult with deceptive ease.

Speaking at a session of the DP training conference here sponsored by Deltak,. Inc., Oncken went on in pep-talk fashion to describe how to be successful in management. Oncken is president of The William Oncken Corp., a consulting firm specializing in organizational planning and development.

To be a good manager requires authority, which is "whatever you have at the moment that will cause someone else to do what you want them to do at that moment," Oncken offered.

He listed four components of authority: character, "the trail you leave behind you"; personality, "the degree to which other people find you easy or hard to listen to"; position, "the delegated right to tell someone what to do"; and competence, "how reliably and intelligently you know what you are doing and what you are talking about."

Employees are hired because of their competence and then advance through an organization because of the other characteristics, Oncken explained. During the education process, professional competence is probably the last acquired characteristic.

Being a good manager depends on determining the component from which others expect you to act, Oncken said.

He gave an example of a manager making a budget presentation to his boss late on a Friday afternoon — after all his budget proposals had been approved in the previous years. The manager wanted to show his competence and thorough preparation, but the boss wanted to rely on the manager's character and word that the budget was correct.

"When you want to influence someone else, find out which authority they want to be influenced from," Oncken said. "If we can be flexible and choose the position of strength we want to operate from, then we can do with deceptive ease what the amateur does with difficulty."

Library Helps Executives Manage New Technologies

By Connie Winkler
CW Staff

CHICAGO — Deltak, Inc. has announced an Information Resource Management (IRM) library to help executives, particularly non-DP middle managers, understand how to manage new technologies.

Deltak specializes in DP training through video tapes. The IRM announcement came at its international DP training conference here: "1980s: The Information Decade."

Developed by The Diebold Group, Inc., management and technology consultants, and Chairman John Diebold, the initial four IRM programs will be shipped in May. Fifty half-hour programs for technical and nontechnical managers are to be developed during the next three years, Deltak President Robert E. King said.

Organize Information

Diebold suggested that a company's success will soon depend on how well it organizes information and then integrates it into the company's decision-making process.

The increasing sums being spent on technology means executives must look harder at the value of information to justify those expenditures. "Decisions now are based on displaced costs. We have to go to decisions based on the time value of the information," Diebold said.

King would not specify how much has been spent developing the IRM series, but suggested it would cost customers at most $15 per halfday, the cost of other Deltak training materials.

Workshops Set On Training

ARLINGTON HEIGHTS, Ill. — "Managing the Training Function," a workshop, will be sponsored by Advanced Systems, Inc. (ASI) in 13 cities in the U.S. and Canada starting with Chicago this month.

The workshop features Nate Newkirk, president of NGP Associates, and Gary Slaughter, president of Gary Slaughter Corp., ASI said.

The conference will be held in Chicago May 21-24 at the Continental Plaza Hotel. It will also be held in New York, June 10-14; Washington, D.C., June 17-20; Toronto, July 8-11; Minneapolis, July 22-25; Philadelphia, Aug. 5-8; Seattle, Sept. 9-12; Cincinatti, Sept. 22-25; Boston, Oct. 7-10; St. Louis, Oct. 14-17; Dallas, Nov. 4-7; Atlanta, Dec. 9-12, and Houston, Jan. 6-9, ASI said.

The conference costs $595, ASI said from 1601 Tonne Road, Elk Grove Village, Ill. 60007.

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As new systems are developed by the vendors, you benefit because we furnish you with the required transfer capability. When you lease or purchase the TNI 303, you select the first 3 vendors you wish and the communications protocols they have created. These PROMs are initially programmed in your TNI 303.

Size: 5" x 18" x 14"; weight, 12 lbs.; transmission speed range: 75, 134.5, 300, 600, 1200, 2400, 4800, 9600 baud. Cost, $8,385. Rental and lease plans available. Delivery, 30 days.

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Because of DPers' Bad Reputation

Companies Found Hesitant to Admit DP's Value

By Connie Winkler
CW Staff

CHICAGO — DP professionals often have such a bad reputation within their companies that top management is hesitant to do what the experts are now urging — admitting the value of information as a resource like labor and factories.

Thomas D. Lutz's observation was aimed at something positive, he said: making systems professionals better.

During a session entitled, "The Mark of the Systems Professional" at the 1980 DP training conference here sponsored by Deltak, Inc., Lutz said companies do not want to admit the value of the information they have because it is in the hands of DP staffers whom they do not trust or understand.

Adding to DPers' bad reputation, Lutz added, is that "DP projects become 90% complete and remain that way." Within corporations DP professionals are viewed suspiciously and not as upper management material because DP projects always take twice as long and cost twice as much as they are supposed to.

Lutz then described, in motivational style, what a systems professional should be, noting that the need for good systems professionals is especially acute. Today there is a demand for 200,000 DP specialists and only 150,000 to meet that demand; by 1985, as more and more computers filter into the corner drug store, the demand will be for 800,000.

Marks of a Pro

According to Lutz, the marks of a pro are:

- *Personal integrity.* "Our job is to take a look at what's going on and figure out how to improve it, to get more done better," the former systems pro said. Now director of education for ITT's Telecommunications Technical Center, he added "If you don't play 'You bet your job' once a day, you aren't doing your job."
- *Logical aptitude.* "State the alternatives and don't hide the ones you don't want to do," Lutz chided. When he was directing a data processing staff, he appointed counter groups of three persons to review what the formal proposal group had done. The counter group ended up asking a lot of nasty — but necessary — questions.
- *Balanced loyalty* between the profession, the organization and oneself.
- *Continuing desire to learn.*
- *Willingness to communicate,* especially to executives and persons who ask "stupid" questions. Spending a lot of time in committees is necessary for this communication if budget and equipment requests are to be approved, Lutz suggested.
- *Ability to communicate technically, conceptually and administratively.* Companies are often not willing to spend much for education because educators have not communicated business-oriented concerns. The productivity benefits of education can and must be measured, Lutz said.
- *Solid knowledge of systems* — not just attending a few programming courses.
- *Objective understanding of the system's role* in the organization. "Systems professionals are not the center of the universe," Lutz quipped.
- *Recognition of the role of people in systems.* "A payroll system is not just what runs on the computer," he observed.
- *Respect for colleagues.* Business people have learned to disagree with each other respectfully — DPers often have not.
- *Involvement in professional organizations.*
- *Patience with users,* who often do not know their needs.
- *Willingness to tactfully take a stand.*
- *Openness to new facts and ideas.*
- *Giving best effort.*
- *Respect for authority.*
- *Thriving under pressure* — and knowing when to say something cannot be done.
- *Finishing the task.* With today's employment market, some are not willing to take on projects that last longer than one year, Lutz lamented.

Seminars Target Manager's Tasks

MINNEAPOLIS — Four management development seminars designed for managers and supervisors will be conducted by the Control Data Management Institute between now and the middle of June.

The two-day sessions will be held in New York, Chicago, Houston and San Francisco and will cover "Supervisory Success," "Time Management and Delegation," "The Secretary as a Manager" and "Leadership and Motivation."

Speakers for the seminars are James Van Lare, president of Training by Design, Inc., and instructors Maureen Sullivan and Robert Maloney.

The seminars cost $345 per person. Further information and exact dates may be obtained by writing 6003 Executive Blvd., Rockville, Md. 20852.

You are invited to an important seminar for Data Processing Directors, Managers and Senior Professionals directly involved with a responsibility for 4300 installation

"What is involved in converting to DOS/VSE? Should you make the investment when MVS could be available shortly?"

"ICCF gives you not only on-line editing, but also on-line interactive debugging. Are you aware of the significent program and people implications?"

"What are the limitations of a 4300 in a distributed network environment? Are the necessary controls and interfaces in place today?"

"If you have ordered a 3310 and or 3370 DASD, what are the implications for ISAM files?"

"Are the performance claims myths or realities? Will the 4431 really meet your needs?"

Recent user experience, problems encountered in 4300 implementation, combined with rumors that DOS/VSE might be replaced by MVS within two years, could lead managers to the conclusion that the 4300 facilities available today will be very different in two years' time.

SEMINAR ANNOUNCED:
To answer questions such as these, Advanced Systems, Incorporated is pleased to announce a unique one day Management Planning Seminar based upon 4300 installation experiences throughout Europe and the USA. This is your opportunity to benefit from the knowledge gained from those who have already installed the 4300. Their experiences have both raised a number of important issues and can give you significant guidance in implementing your system.

This *practical* seminar is designed to help you recognize, understand and address these concerns and as such, provides a unique insight into the 4300 systems.

There will be four (4) major sessions:

1) "4300 Hardware—description and assessment"
The first topic describes 4300 hardware in terms of its functions and facilities, its required environment, and its expected performance and maintenance considerations. It also clarifies a number of misconceptions relating to 4300 efficiency.

2) "Converting to 4300 Software"
In this session we will examine the DOS/VSE, VS1 and VM Control Programs and their available licensed products. Problems which are inherent in conversion and updating to these operating systems will be described from field experience and discussed in some detail. System IPO/E will be described and problems that have been encountered, which have caused some people to abandon the SIOP/E environment, will also be examined.

3) "Local and Remote Interactive Facilities"
In this session there will be discussions covering the 4300 in an interactive environment. Special attention will be paid to the interactive products of DOS/VSE, ICCF, IPS, and ICPS. The impact and limitations of ICCF with multiple users will also be addressed as well as the interrelationships between ICCF and other interactive packages (for example CICS).

4) "Support and Future Trends"
In the final session the following questions will be discussed: What kind of support can be expected in light of the remote support facilities—does this represent a significant shift in IBM policy? What are the people resource requirements and therefore, training implications? What growth paths will be available to 4300 users? What planning will be required? Finally, is there any truth to the speculations that MVS will become a 4300 standard in the next two years? What other hardware options are likely to be announced?

SEMINAR HOSTS
ASI is hosting this seminar in cooperation with Altergo, Limited, a leading international consulting group who were one of the first IBM 4331 installations in Europe in 1979. The seminar leader is Mr. John Ennever, a Senior Consultant, from London, England.

WHEN AND WHERE
(all one-day sessions are beginning at 9:00 a.m.)

May 28	*Toronto*	*Inn in The Park*
May 29	*New York*	*Sheraton-New York*
May 30	*Chicago*	*Continental Plaza Hotel*
June 2	*San Francisco*	*St. Francis Hotel*
June 3	*Los Angeles*	*Bonaventure Hotel*
June 5	*Houston*	*The Houston Oaks*
June 6	*Atlanta*	*The Omni*

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In Benchmark Testing

HP System 45 Delivers Impressive Performance

By Hillel Segal

The Hewlett-Packard Co. System 45 is evidence that a great deal of computing power now fits in a desktop package. Despite its compact appearance, the System 45 delivered an impressive performance in the Association of Computer Users' (ACU) benchmark testing series for computers in the $15,000 to $25,000 range.

ACU User Comparisons

In both hardware-exercising tests (CPU and I/O), the System 45 was rated "excellent." It scored that same mark in two of the three real-life applications tests, but fell to a "fair" performance (eighth place — its poorest showing) in the accounts receivable benchmark run.

Editing on the HP 45 was also rated "fair," slowed possibly by lack of a global editing capability.

The System 45 tested contained 62K bytes of memory, a graphics package, a Basic interpreter, thermal line printer and two cartridge tape drives in a single CRT/keyboard package. Two dual-density diskette drives were also used; these were in a seperate case.

Since the tests were run, HP has expanded the System 45 line to include two new processsor/memory packages. The 984A processor tested in our benchmark series has been replaced by the 9845B. While the latter offers greater memory expandability (to 450K instead of 64K bytes), the system is otherwise very similar to the product tested and can be expected to turn in a comparable performance in the benchmark runs.

Outstanding Features

Features that users rated outstanding on the System 45 included the CRT graphics display and the enhanced version of Basic (the only language available). Generally, the users contacted by ACU seemed to feel a compact package with good performance was more important than the price tag.

Of those HP users surveyed, the majority were scientific and technical people using the system in a laboratory or for testing purposes. They cited the large number of lab-oriented peripherals as a major feature of the HP line. Applications for the system ranged from sea water testing to structural analysis, statistics and bearings design.

Most respondents were pleased with the hardware, saying it was powerful and reliable. For some, prior experience with HP instruments was a factor in favor of the HP small computer.

This shouldn't be too surprising, since the data communications environment of a computer system is an extremely important factor to weigh in deciding the type of vendor from which to buy. The computer must be able to interface properly to both bigger and smaller devices existing in the same environment. These may range from a small terminal or instrument to a large mainframe computer.

At some point it is important to ask, "Does the system under consideration work compatibly with all its neighbors?" The answer is crucial to success.

The question of compatibility goes beyond matching transmission rates and protocols. For instance, if a regional minicomputer is installed as a distributed processing link to a mainframe, it is very useful to be able to run identical programs on either machine. If a program starts out on the smaller system but grows in size to the point where it no longer fits, it can then be transported to the bigger computer.

In the scientific community, compact packaging and strong performance are as important as interfacing to a variety of devices. Because the HP 45 is part of a family of plotters, graphics devices and measurement instruments, it has evidently made a home where those devices can be used.

Despite this, the most significant area of complaint echoed in our survey was with the HP software support provided to peripherals. Laboratory users often felt they needed additional software to complement the instrumentation, but were unable to get this through HP.

This is hard to comment on, since the independent consulting firm ACU engaged to do these tests did not use the optional instruments in the benchmark testing. The standard benchmark programs were modified slightly to fit the HP version of Basic.

ACU did find that the Basic interpreter offered some especially powerful additions, including string manipulation functions, ability to specify single or double precision and a comment delimiter for comments on the same line as statements.

Other Notable Features

Other notable features of the system are buffering of I/O to increase the speed of the mass storage devices (floppy disks) and overlapping of CPU and I/O functions. In addition, plotting and graphics capabilities are available optionally in read-only memory, making the System 45 the first of the systems discussed in this series to offer such an option.

One user commented that CRT/-Graphics combination was very important in his decision to purchase a System 45, while another user said he rates the CRT far ahead of the small screen on the IBM 5110 (covered in an earlier column).

While the System 45 has a pair of built-in cartridge tape drives, these were not used for the benchmark testing runs. Rather, a pair of the optional floppies were called on for mass memory access. In this way, the machine was comparable to the others tested in this series. Hard disks are also available as an option.

In comparing the systems reviewed here to date, one can see that all appear to work best in slightly different environments. The IBM 5110 is suited to a business environment in which all applications will be provided by the vendor. The Wang Laboratories, Inc. 2200VP provides excellent performance in a limited software support environment. The Texas Instruments, Inc. FS990/10 and HP 45 small computers are oriented to a setting in which the end user works self-sufficiently with the basic software utilities provided by the manufacturer.

Comparing the systems through the benchmark testing process is an important way of providing a measure of the raw computing power available in each system. But one thing is obvious: The ultimate usability of the computer in a specific setting cannot be known without considering the software and other support necessary to the success of the application.

Scorebox

System: Hewlett-Packard Co. System 45
Current Price: $26,550*

		Benchmark Results	
		Time	Ranking**
C-1	Scientific/-Engineering Problem	4 Min 39 Sec	3rd
C-3	Accounts Receivable	5 Min 6 Sec	8th

Other Benchmark Ranks**

	C-1	C-3
IBM 5110	8th	4th
Wang 2200VP	1st	3rd
Texas Instruments FS 990/10	***	2nd
Hewlett-Packard System 45	3rd	8th

*Current price is of System 45B, which superceded the model tested but appears to have similar if not identical operating characteristics.

**Out of 12 systems tested in this series.

***Could not run because of memory limitations using TI's standard 990 Basic. Using Power Basic (available from TI's Semiconductor Division), C-1 ran in 6 min 31 sec and would rank between 3rd and 4th place if the run were compared with those of other systems.

This is the last in a series of articles giving the highlights of benchmark tests conducted on popular small computer systems. The full reports were originally published by the Association of Computer Users, a 4,000-member nonprofit organization.

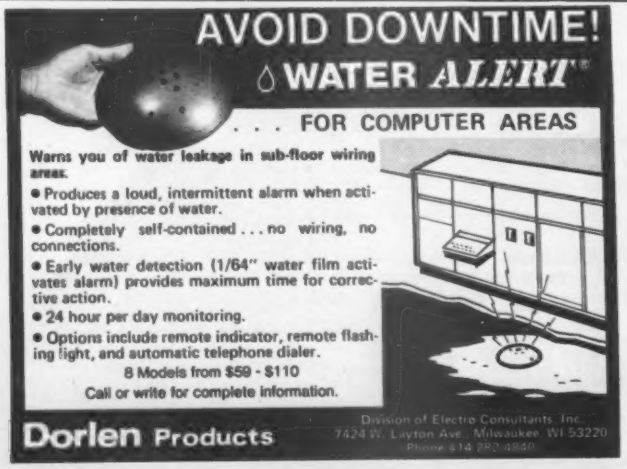
About the Author

Hillel Segal is president of the Association of Computer Users (ACU), a nonprofit association with members all over the U.S., Canada and several foreign countries.

One of the association's key activities is the publication of its "Benchmark Reports."

ACU's Series No. 1 reports on systems priced less than $15,000. Series No. 2 covers the range from $15,000 to $25,000, and Series No. 3 tests systems priced between $25,000 and $50,000.

Full reports on these benchmark tests are available from ACU. The entire Series No. 2 is available to members for $150 (annual dues are $25). More information is available from the association at P.O. Box 9003, Boulder, Colo. 80301.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Banks Miscalculate Early-Withdrawal Penalties

By Rita Shoor
CW Staff

MIAMI — Savings and loan depositors who decide to cash in their savings certificates early and accept the corresponding withdrawal penalty might be well-advised to check the computer-calculated amount carefully. Four S&Ls in southern Florida have determined that they have overstated the penalty in certain cases for at least two months and possibly for a much longer time.

The program error affects only those accounts in which interest was regularly withdrawn, according to spokesmen at Financial Federal Savings and Loan Association of Miami. In those cases, the penalty was calculated as though the interest had still been accruing in the account. The number used to calculate the penalty was, therefore, artificially inflated and so was the penalty that resulted from the calculation.

"We don't believe that those customers who let their interest accumulate and paid a penalty only when they cashed in their certificates were affected," Jules Arkin, the bank's president maintained.

First Florida Financial Investment Corp., Financial Federal's computer subsidiary, also processes certificates of deposit for Security Federal Savings and Loan of South Miami, Interamerican Federal Savings and Loan, and Union Federal Savings and Loan of Miami.

Extent of Error

As of April 23, neither officials of the S&Ls nor spokesmen for the Federal Home Loan Bank Board, which regulates the firms, could determine exactly how many people were affected by the error or how much money they might have lost.

"If only 1,000 customers are involved then it may take perhaps a month to resolve," Arkin noted. "But if we have 4,000 customers who paid incorrect penalties, then it could take three or four months.

"It's a computer programming error, it hasn't been fixed, we're working on it but at least some customers' accounts may require a hand calculation in the future to ascertain the correct amount of penalty."

The availability of interest rates of 17% or more for other comparable investments provided the stimulus for S&L customers to cash in their savings certificates and accept the calculated penalty. Current interest rates for such certificates range from 5.75% for a six-month certificate to 8% for eight years.

Banks' DP Bugs Seen Inevitable

By Rita Shoor
CW Staff

MIAMI — The combination of the number of interest options offered to savings certificate depositors and the complexity of the calculations of early-withdrawal penalties for certificate accounts make it almost impossible to guarantee that a DP system will produce the right figures all of the time.

"Regardless of the computer system, they all have bugs," according to Bill Sherman, assistant controller at Peninsula Federal Savings and Loan here. "The only way to get around [incorrect calculation] is to do it manually, and then you have the possibility of human error."

Peninsula Federal, with assets of approximately $403 million in 1979, was prompted to check the formulas which determine early-withdrawal penalties when it discovered a programming error in Financial Federal Savings and Loan's DP system (see related story).

Peninsula found that customers might be overpenalized if they had altered their accounts so that interest which previously had been mailed on a regular basis was left to accrue. But people who changed their accounts so that accrued interest was instead regularly withdrawn might have been underpenalized, S&L officials said.

Interest Options

The key to the processing problem appears to be a change in the method of handling interest for an account. When the account is initially opened, the customer has a number of options. Among them are receiving the interest check on a monthly or quarterly basis, transferring the interest to another account at monthly or quarterly intervals, having the interest compounded and added to his account each quarter and allowing the account to accrue to maturity with the interest added on that date.

If the depositor begins with one option, then switches to another, and then withdraws the savings prior to the certificate's maturity date, the penalty is calculated based upon the newer option without taking account of the original choice. The result can be either an overstatement or an understatement of the penalty amount.

The Federal Home Loan Bank Board, the S&L's version of banking's Federal Reserve Board, added a complicating factor by changing the penalty calculation method in July 1979.

"If a person has two certificate accounts, one with us and one with a competitor, and the account variables [amount on deposit, start date, early withdrawal date and so on] are identical, he will sometimes be charged different penalties for the early withdrawal," Sherman said.

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Tighter Controls Urged for Exports to Soviets

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Legislation to place tighter controls on sales of high technology — such as computer hardware and software — to Soviet-bloc contries has been introduced in the U.S. Senate.

The Commerce Department, the lead agency in export licensing, "has failed to consider adequately the national security of the U.S. — frequently allowing its strong export promotion bias to overwhelm its national security responsibilities," Sen. Jake Garn (R-Utah) told an April 24 press conference.

Garn introduced the legislation the same day, saying new export guidelines instituted by President Carter following the Soviet military intervention in Afghanistan will not be effective under the present export administration system [CW, March 24].

"I am not satisfied that the new guidelines will be more effective than the old ones in controlling the flow of national security-sensitive technology to the Soviet Union," he said. "Nor am I satisfied that the Commerce Department can be expected to administer the new guidelines properly."

Garn also complained that the new trade restrictions apply only to sales to the Soviet Union and not to the Warsaw Pact nations. He said it is "naive" to think there will no diversion of goods to the Soviet Union from its East European allies.

Independent Office

The proposed legislation would create an independent Office of Strategic Policy (OST) in the executive branch to consolidate the export control activities now split among several federal departments and agencies, primarily the Departments of State, Commerce and Defense.

The present system is too diffuse and overlapping to be effective, according to Garn, who also noted there are about 30 unfilled staff positions in the present Office of Export Administration.

The OST would be headed by a director who would be appointed by the President and confirmed by the Senate for a two-year term of office.

The OST mandate would be twofold, according to Garn. It would police the sale of items that might be diverted to Soviet military purposes and would at the same time work to promote the export of non-strategic goods and services.

The present system neither adequately controls high-technology sales nor effectively promotes U.S. trade overseas. By providing a centralized office with greater staff to handle export license applications, the OST would accomplish both objectives, he said.

According to the Garn plan, the OST would receive export license applications and distribute them to other agencies for review. The Defense Department could not be overridden in the review process, and OST approval of a request in spite of Defense's objection would be sent to the President for a final decision.

Separate OST offices of computer licensing and electronics would prepare criteria for licensing DP and electronics items in accordance with commodity control lists.

Cocom Participation

In addition, OST officials would assume full responsibility for commodity control lists, currently the task of the Commerce Department. The new office would have the authority also to participate in deliberations of the Coordinating Committee (Cocom), which represents most of the North Atlantic Treaty Organization countries and Japan.

Cocom must approve any exceptions to its control lists before any government can authorize export of high-technology goods and services to communist countries.

By taking Cocom negotiations away from the State and Commerce Departments, OST would not be hindered by "biases" of trade promotion and diplomacy, Garn said. The U.S. could then insist on — rather than have to ask for — international cooperation in controlling trade to the Soviet Union.

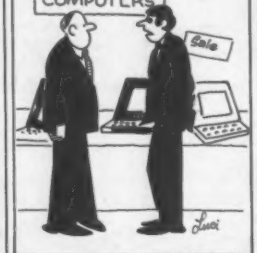
The legislation is necessary, Garn said, because "our failure to control the transfer of national security-sensitive technology to the Soviet Union and other controlled countries has led to a significant improvement in Soviet-bloc military capabilities."

The Soviet Union has purchased approximately $18 billion in capital goods from the U.S. during the last seven years, according to Garn. Current Western trade and credits to the Soviet bloc amount to almost $70 billion.

These imports allow the communist countries to apply much more of their resources to military spending, Garn said, adding that "essentially, we are funding two defense efforts — theirs, and ours."

Although he has already gathered nine or 10 cosponsors for his bill, it is not clear what chances it has for passage this year. The present export administration system was revamped just last year after lengthy debate.

Garn said he hopes to have the bill referred to the Senate Banking Committee, of which he is the ranking minority member and which has jurisdiction over the Export Administration Act.



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Responsible Career Planning Begins at Home, DPers Told By Federal Personnel Expert

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — DPers thinking about advancing their careers should adopt the attitude of "do it for yourself because nobody's going to do it for you," one federal career development official said here last week.

Attendees at the Federal DP Expo

CW at Federal Expo

were told they themselves have ultimate responsibility for personal career planning. "You have to assume it for yourself," according to Patricia Hendershot, employee development coordinator, U.S. Agriculture Department Office of Operations and Finance.

DPers cannot rely on their organizations to look out for their careers, she said. Too often organizations offer "a smorgasbord of options" — "vague 'career ladders, career paths'" and sometimes just a list of courses an employee might want to take.

Employees should look beyond the next job they might like and develop lifetime plans based on full assessments of their goals and individual strengths.

Unfortunately, most people do not know what they want in life. To develop a full assessment of what you as an employee want, you should look at your present job in terms of those aspects that are satisfying and those that are not, according to Hendershot.

You should consider such factors as money (how much salary do you want at particular stages in your career?) and time (how much time are you willing to spend on the job and away from your family and outside interests?).

You should gauge your strengths in terms of functional and transferable skills — the skills and abilities he has developed, not just the tasks he has performed, she said.

Start Planning

Once you know what you want in general terms — a management position, for example — then start planning your career, Hendershot recommended. Look at trends in job opportunities, skills in demand, salary levels associated with those skills and new technology.

Getting that kind of information is easier than might be supposed and watching newspapers and magazines is one way to track employment trends. Considerable information is also available from government sources such as the Labor Department's Bureau of Labor Statistics.

Among the best sources for career information are professional societies. Meetings of such societies can provide useful contact in the industry.

"You have to keep up with what is going on," Hendershot said. The good jobs often are not advertised, but you can hear about them. This "ear-to-the-ground" approach can be very productive, but you have to know what you want and be ready to make a move when you hear about a good career opportunity.

"What you have to focus on is where do you want to be ultimately, and how do you move to get there," according to Hendershot. She cautioned that "career planning is not the same as planned job hunting."

Sometimes the two can mesh nicely, but sometimes you have to plan three or four jobs ahead. Some job changes may have to be lateral in order to further your long-range plan.

As an example, she noted that some DPers advance as far as possible in technical jobs, but have to move laterally to gain the management experience necessary for an eventual move up the corporate ladder.

The reward of a full career plan is that the employee does not end up relying on his organization to take care of his advancement, a stance that can lead to great job frustration.

If you decide to change organizations — and according to Hendershot you should never hesitate to consider that kind of move — you should ask yourself if you want to change because of a dead-end job or because you are unhappy in your current environment.

A frustrating environment can lead to lower self-esteem, which can make it almost impossible to sell yourself to prospective employers. A long-range plan can solve that problem and help you avoid "the burnt-out syndrome," which she described as "very real."

The good news is that the DP field is growing very rapidly and offers many opportunities for advancement. To take advantage of the industry, you should "give yourself a time schedule and stick to it."

Communications Seminars' Topic

BROOKLINE, Mass. — A series of two one-day seminars focusing on telecommunications and some of the trends, policies and developments affecting the industry will be held on May 22-23, June 26-27 and July 24-25 in Washington, D.C., sponsored by Information Gatekeepers, Inc.

The first session, "How to Find Information on Telecommunications," is designed to show attendees where and how to get more data on developments in the telecommunications area, especially from U.S. government sources, a spokesman said.

The second course, "Trends and Recent Developments in Telecommunications Policy and Regulation in the U.S.," will cover related activities taking place in Congress, the Executive Office, the Federal Communications Commission and the Justice Department.

The registration fee for one seminar is $275 or $495 for both, including course notes and lunch.

Additional information on the conferences can be obtained from Information Gatekeepers at 167 Corey Road, Brookline, Mass. 02146.

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IBM Still Submitting Documents for Trial

By Connie Winkler
CW Staff

NEW YORK — IBM is in the process of introducing 5,000 to 6,000 documents into the U.S. vs. IBM trial before it proceeds with its final round of witnesses — economic experts.

So far Judge David N. Edelstein has ruled on about 1,200 of the documents, which IBM counsel Ronald S. Rolfe described as census documents, trade press materials, third-party materials including brochures and annual reports and miscellaneous IBM internal documents. The census documents, about half of this total group, are from IBM's survey of firms it says are in the electronic data processing market.

Before offering the documents to the court, IBM first presents the documents to the Justice Department to review in categorized batches. "We are making progress with the paper case," according to Justice lawyer John H. Chapman, who is handling this part of the case. The government's primary objection has been that advertisements should not be offered as the truth.

In the meantime, IBM's economists are readying written narratives which will be used in place of live direct testimony, although there will be live cross and redirect examination.

"It is going to save an enormous amount of court time, although the total time elapsed may be longer," Rolfe said about the narratives.

Once the government receives the first narrative, the economists will take the stand in two weeks.

The trial has been adjourned since early March in preparation for the economists, who are expected to tie together the many threads of this complicated antitrust trial. IBM has also said it needs the documents submitted before it can proceed with the economists.

SSP Schedules June 2-4 Meet

MINNEAPOLIS — The Second Annual Meeting of the Society for Scholarly Publishing (SSP) to be held here June 2-4 will examine the interaction between professionals in all areas of publishing and the technologies created to assist them.

Some of the topics to be addressed at the meeting include:

- The philosophical implications of understanding rather than fearing technology.
- The effective and economical use of the current and next generation of equipment.
- The applications of technology in the editorial, production and distribution areas of publishing.
- The impact and use of technology within the library and information communities.

Aside from the general sessions, there will be "breakout" periods for discussion on a more intimate level.

Registration costs $65 for SSP members and $85 for nonmembers. One-day registration fees range from $15 to $40, SSP said from 2000 Florida Ave. N.W., Washington, D.C. 20009.

Call for Papers

1980 INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE) ENGINEERING MANAGEMENT CONFERENCE, Wakefield, Mass., Nov. 12-14.

The umbrella theme of this conference is "Economic Stimulation via Technological Innovation," under which forecasting of technology, technology transfer, changing patterns of management and new business in the economy will also be covered.

Papers are invited on related or unrelated, interesting topics with an emphasis on proven empirical research. By May 31 either a draft, an abstract or a formal summary should be submitted to Prof. Aileen Cavanagh, Boston University School of Management, 212 Bay State Road, Boston, Mass. 02215.

IBM, U.S. 'Contemplating' Resuming Settlement Talks

By Connie Winkler
CW Staff

NEW YORK — Additional settlement talks are "contemplated" in the U.S. vs. IBM case, spokesman for both parties said after a sixth meeting on procedural questions. No date has been set for those talks.

The sixth meeting — between U.S. Attorney General Benjamin R. Civiletti and IBM's negotiators — occurred April 25 after IBM accepted Civiletti's statement a week earlier that there was no precondition on the settlement talks.

IBM had balked at continuing the talks after Assistant Attorney General for Antitrust Sanford Litvack said the Justice Department would not settle for anything less than divestiture. IBM had called this a "public precondition" on the talks which had not been raised before.

In a press conference April 17, however, Civiletti said there was no precondition, but neither was he "highly optimistic" that the talks would succeed.

IBM Appeal

An IBM spokesman in Armonk, N.Y., emphasized that the resumption of the talks was set up before the U.S. Second Circuit Court of Appeals rejected IBM's second attempt to get District Court Judge David N. Edelstein pulled off the lengthy antitrust case. That one-page court of appeals rejection came down April 23.

IBM had asked for a rehearing of the recusal petition by the entire panel of Court of Appeals judges. On Feb. 25, a three-judge panel of the appellate court rejected IBM's bid, stating that IBM had not proven the necessary "extrajudicial" — outside of the courtroom — prejudice.

IBM said it had not yet decided whether to appeal further to the U.S. Supreme Court.

Secretary of State Candidate Once Worked on IBM Cases

WASHINGTON, D.C. — Deputy Secretary of State Warren M. Christopher, who until Edmund Muskie's appointment as Secretary of State last week was considered a possible replacement for Cyrus Vance, played an active role in IBM's West Coast antitrust cases.

Christopher, who is reportedly "disappointed" about being passed over, said last week he will resign the post after a "good transition."

Christopher was described as the "silent, senior partner" in the courtroom in early forays in what have come to be known as the West Coast cases involving, among others, Memorex Corp. and Transamerica Computer Corp.

Prior to joining the Carter Administration in 1977, Christopher was a partner in O'Melveny & Myers, which represented IBM in the California actions.

Vance, who resigned over the Iranian hostage rescue mission, was himself on IBM's board of directors while a law partner in New York City. Christopher and Vance are just two of a long string of high Carter Administration officials with ties to IBM. Others include Secretary of Defense Harold Brown and Secretary of Health and Welfare Patricia R. Harris — both former IBM directors — and Thomas J. Watson Jr., former IBM chairman, now ambassador to the USSR.

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System Taps Voter Base

Campaign Turns Rep. Gore Into DP Convert

By Marguerite Zientara
CW Staff

WASHINGTON, D.C. — A number of lawmakers who were introduced to the benefits of DP during their election campaigns have concluded that DP tools could greatly simplify their routine office tasks here on Capitol Hill.

One example of such a convert is Rep. Albert Gore Jr. (D-Tenn.), who used a computer on the campaign trail four years ago in Tennessee to schedule appearances and keep himself up-to-date on current issues.

Three months after Gore was elected in 1976, his office acquired its own Xerox Corp. 800 dual-tape cassette word processing system that is connected via telephone lines to computers at Dialcom Computer Services in Silver Spring, Md.

This system has made a valuable contribution. "We ranked the 25 counties in the [fourth] district by population, in descending order, when I first got to Washington three years ago," Gore recalled. "Then we decided on open meetings [with constituents] as the best way to maintain visibility and distribute information to constituents.

"Since that time, we've used the computer to schedule 575 of these meetings," he added. "I get frequent printouts showing where I've held them, the number of visits made to each population center and a priority list of where the next series should be staged."

Typical Benefits

Maintaining that the computer has the strongest impact of any single communications tool he uses, Gore described some typical benefits of his system: "Say I'm on my way to Lincoln County, because the computer said that's where the next open meeting should be. On the way there, I'm studying a printout showing me the names of every resident of that county who has written us requesting something. This updates me on just about every situation I'll run into during the meeting.

"The printout also has the status of every grant we're working on for groups in the county and updated information on county officials and the press," he added. "When I go to that meeting and make my rounds in Lincoln County, the computer keeps me from being stumped."

Mailings and Questionnaires

Besides keeping Gore current on his constituents' problems and concerns, the computer-based word processing system is used for "some correspondence, mass mailings and follow-up mailings," according to Robbin Shupp, Gore's computer operator.

"When people write in for information about particular subjects, we code their names to indicate the subject they're interested in. Later, when information becomes available on that subject, we'll create mailing labels using the coded names and send information to the appropriate people," she explained.

Dialcom, a computer service bureau with eight Prime Computer, Inc. Model 750 computers and nine Honeywell, Inc. 1648s, does work for many government agencies and a few individual politicians, but handles private industry primarily, according to a company spokesman.

Speaking of Gore's case, Shupp said, "We can extract names and addresses from Dialcom's computer, or we can access any text we have stored there,

put the data on our cassette tapes and run whatever we have to run. That way, while our program is running we can still have access to the computer."

Gore's staff also uses the system to send questionnaires to constituents, "asking people if we can help them in any way," Shupp said. Depending in what respondents indicate an interest "as new legislation happens or as something comes up to change the status of a particular issue, we'll send them the information for their own knowledge."

And will Gore use his computer system to help him get reelected this fall? Not if he wants to stay within the boundaries of the law. "The particular funds [allocated for computer usage] are paid by the taxpayers, and you can't use taxpayer's money to do things for your campaign," Shupp explained.

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Calendar

June 1-6, Lincoln, Neb. — **Technical Leadership Workshop.** Contact: Ethnotech, Inc., P.O. Box 6627, Lincoln, Neb. 68506. Also being held June 22-27 in Lincoln.

June 2-3, Washington, D.C. — **How to Manage Data and Information as a Resource.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

June 2-3, New York — **Data Communications: Advanced Concepts and Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 12-13 in Chicago and June 26-27 in Washington, D.C.

June 2-3, New York — **Corporatewide Packet-Switched Data Networks,** sponsored by *Data Communications* magazine. Contact: McGraw-Hill Expo Center, Room 3677, 1221 Ave. of the Americas, New York, N.Y. 10020.

June 2-4, Wellesley, Mass. — **Effective Methods of DP Quality Assurance.** Contact: Q.E.D. Information Sciences, Inc., 141 Linden St., P.O. Box 181, Wellesley, Mass. 02181.

June 2-4, New York — **Word Processing: Effective Operations Management.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 23-25 in Washington, D.C.

June 2-4, Washington, D.C. — **International Symposium on Comparative Data Base Management Systems.** Contact: Advanced Management Research, Inc., 1370 Ave. of the Americas, New York, N.Y. 10019.

June 2-4, San Francisco — **Introduction to Teleprocessing Software.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 25-27 in Washington, D.C.

June 2-4, Chicago — **DP Project Management: A Practical Approach.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 16-18 in Washington, D.C. and June 23-25 in Los Angeles.

June 2-4, Chicago — **Fundamentals of Data Processing for the Non-Data Processing Executive.** Contact: University of Chicago, 1307 E. 60 St., Chicago, Ill. 60637.

June 2-4, New York — **Data Entry.** Contact: Data Entry Management Association, P.O. Box 3231, Stamford, Conn. 06905.

June 2-4, Teaneck, N.J. — **Computer Control and Audit.** Contact: Q.E.D. Information Sciences, Inc., 141 Linden St., P.O. Box 181, Wellesley, Mass. 02181.

June 2-4, Chicago — **Data Base Management Systems: General Concepts.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 11-13 in Washington, D.C.

June 2-4, Los Angeles — **Leadership Skills for Project Managers.** Contact: American Management Associations, 135 W. 50 St., New York, N.Y. 10020.

June 2-4, Chicago — **Introduction to IMS DL/1.** Contact: Data Base Management, Inc., 281 Hartford Tnpk., Vernon, Conn. 06066.

June 2-4, Chicago — **Word Processing: An Overview of Concepts, Systems and Applications.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 9-11 in Atlanta, June 19-20 in San Francisco and June 23-25 in Los Angeles.

June 2-4, Washington, D.C. — **Practical Approaches for Improving Systems and Organizational Productivity.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 23-25 in New York.

June 2-4, Los Angeles — **Data Communications: Effective Network Design.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 18-20 in New York and June 25-27 in Chicago.

June 2-6, New York — **Software Engineering Lectures.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

June 2-6, W. Lafayette, Ind. — **Symposium on Machine Processing of Remotely Sensed Data,** sponsored by the Institute of Electrical and Electronics Engineers. Contact: D. Morrison, 1220 Potter Drive, W. Lafayette, Ind. 47906.

June 2-6, Washington, D.C. — **Modern Data Communications.** Contact: George Washington University, Continuing Engineering Education, Washington, D.C. 20052.

June 2-13, Santa Margherita, Italy — **Software Enginering,** sponsored by the Institute of Electrical and Electronics Engineers. Contact: Dr. H. Freeman, Rensselaer Polytechnic Institute, Troy, N.Y. 12181.

June 3-4, Wellesley, Mass. — **User's Role in Systems Development.** Contact: Q.E.D. Information Sciences, Inc., 141 Linden St., P.O. Box 181, Wellesley, Mass 02181.

June 3-5, Chicago — **Managing the DP Professional — The Challenge of the '80s.** Contact: Ubi Enterprises, 30 Milbank Ave., Greenwich, Conn. 06830.

June 3-5, Raleigh, N.C. — **Word Processing.** Contact: Q.E.D. Information Sciences, Inc., 141 Linden St., P.O. Box 181, Wellesley, Mass. 02181.

June 3-5, Detroit — **Expo 80.** Contact: The Conference Co., 60 Austin St., Newton, Mass. 02161. Also being held June 10-12 in Chicago and June 17-19 in Cincinnati.

June 3-5, London — **Networks '80.** Contact: Online Conferences Ltd., Cleveland Road, Uxbridge, England UB8 2DD.

June 3-5, Chicago — **Advanced Data Base.** Contact: Eastern Technical Associates, Inc., 20 Wells Ave., Newton, Mass. 02159.

June 3-6, Mexico City, Mexico — **Automated Business Systems Exhibition.** Contact: Industry Participation Division, Office of Export Promotion, U.S. Department of Commerce, Washington, D.C. 20230.

June 3-6, New York, — **Structured Systems Design.** Contact: Langston, Kitch & Associates, Inc., 715 E. 8 St., Topeka, Kan. 66607.

June 4-5, Smithfield, R.I. — **Improving Managerial Skills for Women Managers.** Contact: Center for Management Development, Bryant College, Smithfield, R.I. 02917.

June 4-5, Washington, D.C. — **Information Systems Risk Analysis Training.** Contact: CRC Systems, Inc., 4020 Williamsburg Court, Fairfax, Va. 22032.

June 4-5, New York — **Advanced Office Automation.** Contact: Yankee Group, Harvard Square, P.O. Box 43, Cambridge, Mass. 02138. Also being held June 10-11 in Palo Alto, Calif.

June 4-6, Washington, D.C. — **Automating Your Office Today: Planning and Implementation.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 23-25 in Atlanta.

June 4-6, Washington, D.C. — **Electronic Mail: An Overview of Concepts, Systems and Applications.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 25-27 in Atlanta.

June 4-6, Washington, D.C. — **Audit and Control of Online Systems.** Contact: Institute for Professional Education, Suite 303, 1515 N. Court House Road, Arlington, Va. 22201.

June 4-6, Montreal — **Salon International de l'Ordinateur et Conferences,** sponsored by the Canadian Information Processing Society. Contact: Reg Leckie, Show Manager, 36 Butterick Road, Toronto, Ont. M8W 3Z8.

June 4-6, Chicago — **Systems Analysis and Design: Concepts and Effective Practice.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 16-18 in Los Angeles.

June 4-6, Chicago — **Data Processing: An Introduction to Concepts and Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 18-20 in San Francisco and June 25-27 in Houston.

June 4-6, New York — **Computer Performance Measurement: Tools and Techniques for Increased System Productivity.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 23-25 in Los Angeles.

June 4-6, New York — **Integration of Word Processing and DP Systems.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075. Also being held June 25-27 in Houston.

June 4-6, Washington D.C. — **How to Build and Use a Data and Information Resources Directory.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

June 5-6, Wellesley, Mass. — **Effective Presentations.** Contact: Q.E.D. Information Sciences, Inc., 141 Linden St., P.O. Box 181, Wellesley, Mass. 02181.

June 5-6, Chicago — **Introduction to IMS Data Communications.** Contact: Data Base Management, Inc., 281 Hartford Tnpk., Vernon, Conn. 06066.

June 5-7, Alexandria, Va. — **Society for Industrial and Applied Mathematics Meeting.** Contact: H.B. Blair, 33 S. 17 St., Philadelphia, Pa. 19103.

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With Care and Respect

Treat Employees Like Clients, Managers Told

By Jeffry Beeler
CW West Coast Bureau

MINNEAPOLIS – DP managers still have a lot to learn about appreciating the value of their subordinates and managing them effectively, an executive said recently at NCR Corp.'s 10th annual users group meeting.

Like their counterparts in other business disciplines, most DP managers become so preoccupied with the bottom line that their most important resource – people – seldom receives the management attention it deserves, according to Jim Thayer, distribution, development and training manager for the Speed Queen Co.

To streamline their operations and boost staff productivity, DP managers should treat their employees with the same care and respect they routinely extend to their customers, Thayer said during the meeting's keynote address.

Thayer also advised his estimated 800 listeners to "sell" their employees on the importance of their jobs and on the importance of the missions their companies are trying to accomplish.

Success in managing people, the speaker continued, depends in part on a supervisor's ability to generate enthusiasm among his staff members and to create a departmentwide atmosphere of trust.

It also depends to a large extent on a manger's ability to motivate. Work itself, not managerial prodding, is the true key to motivating computing personnel, Thayer said.

DP managers, therefore, should strive to create a work environment in which their employees want to motivate themselves, he explained.

Another element of success in managing people, according to Thayer, is a DP manager's ability to overcome his subordinates' natural inclination to resist occupational change.

Effective Managers

In other portions of his address, Thayer described effective DP managers as individuals who have mastered the knack of communicating persuasively. Although most computing room chiefs regard themselves foremost as technologists, they should take care not to underestimate the value of interpersonal communications, he advised.

Effective DP managers also appreciate the importance of continuing education and the need to constantly upgrade their professional skills. Moreover, they understand why their employees need to maintain a positive attitude toward their work.

"Get rid of people with bad attitudes immediately," Thayer told his audience. "They'll contaminate everyone in your whole department."

In other advice, Thayer urged DP managers to resist at all costs the impulse to procrastinate. "The 'I'll-do-it-when-I-get-around-to-it' attitude is a fantastic detriment to a manager and, when used to put off your employees, is a form of discrimination," he told the NCR users.

CW at NCR Users Meet

NCR Plans for Early 1980s Include 'Comprehensive' CNA Program

By Jeffrey Beeler
CW West Coast Bureau

MINNEAPOLIS – NCR Corp. users recently caught a glimpse of their DP future when their vendor's chairman, William Anderson, outlined the company's plan for meeting its customers' needs during the early 1980s.

The plan, described during the opening day of NCR's 10th annual user group convention, provided scant details. It did, however, reveal the basic thrust of the firm's product strategy for the next five years in communications, software, support and hardware.

Among its highlights, the plan calls eventually for the development of:

- A "comprehensive data-communications program" based on the Communications Network Architecture (CNA) of NCR's recently acquired subsidiary, Comten.
- An additional processor family "spanning the entire communications range."
- Enhanced versions of two major NCR operating systems.
- A single, standardized controller language.
- A single, standardized terminal language.
- An expanded support and marketing staff.
- Additional in-house semiconductor production facilities.

CNA as Cornerstone

On the communications front, the plan calls for the development of a CNA-based program that will apply as much to NCR's microcomputers and terminal subsystems as to its mainframes and minicomputers. Implementation of the program will mean NCR's entire product line will someday confirm to CNA's architecture and protocols, Anderson said.

On the software front, the plan predicts the development of follow-ons to NCR's VRX and IRX operating systems. The following products will prove more technologically advanced than their predecessors and will eventually become the NCR general-purpose computer line's sole operating systems, Anderson said.

Unless its product plan changes unexpectedly, NCR also intends to develop additional programming languages, nonprogrammer languages, query languages, interfaces, transaction monitors and data base managers. In some instances, the board chairman added, NCR might even supply programs developed jointly with independent software houses.

On the marketing and support front, meanwhile, NCR plans to enlarge its domestic and international field staff by an average of about 10% per year for the the next five years. The planned expansions will apply both to direct sales and systems support personnel, Anderson said.

At the same time, NCR has also developed plans to expand its infant Systems Service Network, which was originally formed to advise users on matters involving their operating systems, compilers and other systems software.

By August, the network will consist of five nationwide sites. Plans are under way to extend the service to include application software as well, Anderson noted.

On the hardware front, NCR's product plans call for steadily increasing in-house production of custom-built microcircuits. By 1984, Anderson predicted, internal production will satisfy 60% of the company's total semiconductor needs.

Like most other hardware manufacturers, NCR foresees a continuation of the trend toward ever-increasing degrees of circuit integration. Between now and the late 1980s, component densities will grow from 20,000 gate/chip to almost one million gate/chip.

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Ten Courses Planned

SANTA CRUZ, Calif. — Ten intensive courses in computer science, each ranging in length from four days to two weeks, will be held here July 7 - Aug. 22 as part of the University of California's 10th Annual Institute in Computer Science.

Nineteen instructors will teach the classes, which include "Programming Methodology," "Programming Language Semantics," "Computer System Performance Prediction," "Design and Implementation of Modular Software" and "Compiler Construction."

Prices for the classes range from $625 to $1,200. More information is available from the University of California Extension, Santa Cruz, Calif. 95064.

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Managers on the Move

ANICETA RIVERA has been named director of computer systems at Prudential Insurance Co.'s Roseland, N.J., computer systems and services office.

Rivera has been associated with computer systems operations throughout his 13 years with Prudential. Prior to this promotion, he was a senior computer systems analyst.

He holds a bachelor's degree from Fairleigh Dickinson University and is working toward a master's degree.

Aniceta Rivera

• • •

RAYMOND LIN has been promoted to manager of systems planning for the Management Services Division of McCormick & Co., Inc. in Hunt Valley, Md.

Lin will be responsible for coordinating all requests for computer-based systems for McCormick's operating units and for preparing a master plan which includes corporate headquarters requirements.

Lin joined McCormick in 1974 as a programmer/analyst and was promoted to operations supervisor and then to supervisor of technical support. He was most recently data center manager.

He received a B.S. in business from the University of Maryland and has done graduate work in business at George Washington University.

Raymond Lin

• • •

STEVEN E. CHELSTROM has been named director of headquarters/-manufacturing management information systems (MIS) and DENNIS L. MOLINARO has been appointed director of group/division MIS at the Toro Co. in Minneapolis.

Chelstrom will be responsible for the design, development and implementation, of corporate computer systems.

Prior to joining Toro in 1971, he was a computer programmer for Cargill, Inc. and a school teacher in Clara City, Minn. He holds a bachelor's degree in mathematics from Concordia College.

Molinaro will direct the design, development and implementation of computer systems covering group/-division functions.

Molinaro joined Toro in 1966 as a cost estimator and has held a series of positions during his tenure. He has also worked for Control Data Corp.

• • •

ROLLAND E. RIEN, manager of data processing, has been elected an associate of Dalton, Dalton, Newport, an architect-engineer planning firm in Cleveland.

Rien was a co-inventor of PSU-Ices, a patented programming system, and has eight publications on computer subjects to his credit.

Rien holds both bachelor and master of architectural engineering degrees from Penn State University.

• • •

ROBERT PATTERSON has joined Linkabit Corp. in San Diego as director of data systems. He will be responsible for the direction and management of software development, scheduling, manpower planning, system evaluation and group management of the programming staff.

Patterson joins Linkabit from Litton Industries, where he was manager of software systems. Prior to that he was with Bendix Corp.

He received B.S. and M.A. degrees in computer science/mathematics from Wayne State University.

• • •

RAY L. MCCONNELL has been named staff vice-president of corporate DP at Equifax, Inc. in Atlanta. McConnell will direct all corporate data processing activities, including data communications and telecommunications functions.

McConnell joined Equifax's national credit reporting and collection services company, The Credit Bureau, Inc. (CBI), in 1960 on the management development program in Miami. After serving as assistant manager in West Palm Beach and as head of CBI's home office Operating and Sales Division, he began his DP career in 1970.

He served as Director of CBI's computer operations, then as assistant vice-president, before his promotion to staff vice-president in 1978. He joined Equifax, Inc. as staff vice-president in 1979, with responsibility for corporate telecommunications.

McConnell is a graduate of Florida State University.

• • •

DAN LIN has been appointed vice-president of management information services at W&J Sloane, Inc. in New York.

Lin joined City Stores Co., Sloane's parent company, in 1978 as corporate director of management information services.

His new responsibilities include the planning, design and operation of Sloane's computerization programs.

Who Rates as 'Software Engineer'?

Q After presenting myself as a consultant in software engineering, one of our clients informed me that it is unlawful to do consulting in software engineering, or any other engineering, without being a registered Professional Engineer (PE).

Is he correct?

A The laws and procedures for licensing of professional engineers vary from state to state. However, each law essentially disallows anyone from presenting himself, either verbally or on printed material, as an engineer of any kind without being licensed as a registered PE. According to the letter of the law, you can't call yourself a software engineer and do consulting unless you have the PE behind your name.

Not unlike other bureaucratic systems, there is a Catch-22. To my knowledge, no state offers an examination in the area of software engineering; therefore, in order to become registered, you must take the exam in one of the more traditional areas — electrical engineering, mechanical engineering, chemical engineering, civil engineering, industrial engineering, etc. If you sit for and pass the PE exam in any area, you can do consulting as a software engineer.

Before you panic and send out for a new set of business cards, let me put this into perspective. I've known scores of vendor representatives who had "systems engineer" emblazoned on their business cards. Not one has spent a day in the pokey for this flagrant unlawful act.

By the way, can anyone recommend a suitable substitute for "engineer" as used in the context of "software engineer"?

Q What do you think about a company competing with itself to sell computers? Presently, three marketing representatives from different divisions of the same company are calling on me.

With three intense independent marketing efforts, each representative is trying to convince me he has a product that will meet my needs. The company line is that internal competition is healthy. Healthy for whom? It's certainly not healthy for my company, and I can't see that it's healthy for the vendor.

A This approach presents a disjointed front which has confused and even alienated thousands of present or potential customers for this range of computer products. It appears to me that by maintaining this marketing strategy, this company is making a conscious effort to give other vendors a sporting chance.

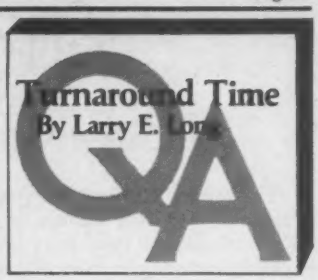
Q Although our company's sales are increasing, our profits are declining. As a result, I have not received and do not expect to receive authorization to replace the two programmer/analysts I've lost in the last four months. That's 25% of the DP department!

We are a card-oriented, batch shop and are well behind the technology, but the fact remains that the company is and will continue to be dependent on the output from DP. Management does not recognize this dependency, however, and I fully expect the staff size to continue to dwindle.

Is there anything I can do to reverse this trend?

A During hard times, corporate management should be turning to DP to increase productivity; instead it often cuts the DP budget. This can only be attributed to management's lack of awareness of what DP can do and, as you indicated, a lack of realization of the company's dependency on DP.

Before you become a one-man show, I suggest you work with your users to identify those application systems areas that could be computerized or improved in order to show a net dollar savings. Develop a benefit/cost analysis for each proposed project. Supplement these analyses with discussions of all of the accompanying intangible benefits (better managerial information through expception reporting, improved customer relations, etc.). Present this package to management to show what can be done, then outline the resources necessary to accomplish what you propose.



As long as you continue to focus on the common good of the company, it doesn't hurt to be aggressive in justifying your existence and future growth.

Have a question? Send it to Larry Long, Editorial Department, Computerworld, *375 Cochituate Road, Rt. 30, Framingham, Mass.01701.*

Long is a professor at Lehigh University, a DP consultant and author.

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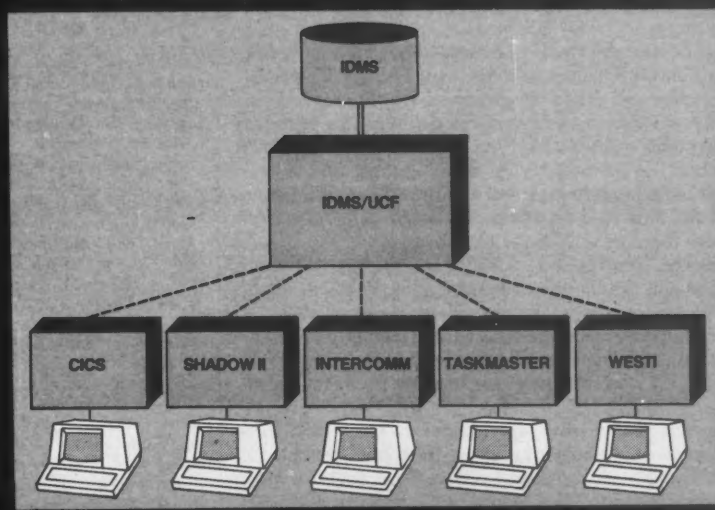

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EDITORIAL

Inflated Problems

The souring economy may provide an acid test of DP managers' ability to truly manage their programming staffs.

The effects of stagflation on DP professionals are complicated, according to those who study that relationship. In many cases, an organization's top management may decide to extend its computing operations in order to boost productivity. But in other cases, top management may elect to trim DP budgets along with the budgets of other departments.

Programmers and analysts currently enjoy soaring growth rates in salary because they are in short supply while very much in demand. Virtually assured of employment in any of the nation's metropolitan areas, top-grade software specialists have no incentive to stay with an organization that fails to offer them challenging, career-enhancing work.

DP managers may therefore have greater difficulty in holding on to valued personnel. The challenge they face is how to give programmers incentive to stay with their organizations and maintain high standards of professionalism.

Different people are motivated in different ways, which means managers who try to motivate all their personnel in the same way can expect especially high turnover in the years ahead.

A Right to Know

Delays in delivering major software packages for IBM's System/38 seem to refute IBM's contention that earlier problems — which caused a one-year delay in delivery of that system — were minor software glitches.

It will take IBM an extra year to deliver major software packages like System/38 Display Management Facility, DMS/38-Improve, Mapics and DMS/38 Financial Applications. With users already waiting an extra year for delivery, the software delays mean some will wait two years before their System/38 is in full swing.

IBM said it is taking advantage of the first delay to improve its software. It contended the revised packages will work even better because the they will be easier to use.

They should be. The revised packages will require 50% more main memory and double the disk storage requirement of the originals.

IBM is undoubtedly concerned that its products work well. But is it so concerned that it would pay its software developers an additional year's salary just to make some packages a little easier to use? Probably not.

But the issue is not whether, given an extra year, IBM software developers could improve upon its own product. Of course it could. But software that requires 768K bytes of main memory — as opposed to 512K — and 129M bytes of disk storage — formerly 64.5M bytes — is not what System/38 customers ordered.

If IBM cannot meet its original specifications, it should be prepared to give its customers an adequate explanation. And if changes were precipitated by major problems in the System/38's operating system, users have a right to know.

DATA PAST

Five Years Ago
April 30, 1975

BOSTON — The Massachusetts Registry of Motor Vehicles instituted procedures to comply with Governor Michael Dukakis' order for a moratorium on the use of the Social Security number as the driver's license number. State Attorney General Francis X. Bellotti ruled that to require drivers to disclose their Social Security numbers to obtain a license was a violation of the Privacy Act of 1974.

Eight Years Ago
April 26, 1972

A *Computerworld* survey found that the more densely packed circuitry of the IBM 370 made it a hot system, and the cost of carrying off this heat gave some companies second thoughts about leaving the 360.

'Announcing next great leap forward, comrades — world's first abacus simulator!'

LETTERS

Cobol and the TRS-80

The Taylor Report in the April 14 issue concerned Cobol and the TRS-80 microcomputer. There are indeed some exciting developments in the Cobol area.

Specifically, we at Radio Shack are introducing next month Cobol for the TRS-80 Model II. It is not a "micro" Cobol but an excellent minicomputer Cobol with multikey Isam that has been adapted to the TRS-80. It is an enhanced Level II Ansi '74 version and costs $299.

Taylor is quite correct that the small memory of the Model I restricts the Cobol sharply, but we will offer Model I Cobol in the future. As far as Cobol training is concerned, that is quite another matter. At this time we are offering Cobol mainly to experienced programmers. If we see enough demand, we will offer Cobol instruction classes at our computer centers in the future.

Jon Shirley
Vice-President

Computer Division
Radio Shack
Ft. Worth, Texas

IBM on System/38

I would like to set the record straight regarding several misleading impressions made about the System/38 by the article "System/38 Hits New Snags" [CW, April 28].

The article presented information, as news, which we had already given to our customers in December 1979 and implied problems with the data base software. It barely referenced the fact that we told *Computerworld* it was not new and clarified the software status before the article was written.

The "news" about System/38 since December is positive:

- The operating system, including the data base function, is performing well at numerous IBM locations.
- We will begin regular customer shipments in July as previously announced.

CW's portrayal of new and continued problems with this product is misleading. I believe publication of this letter is necessary to give readers an accurate view of the situation regarding the System/38.

P.M. Foley
President

General Systems Division
IBM
Atlanta, Ga.

Left Out of Picture

Computerworld is certainly among the most credible publications serving the information needs of the DP community. It is held in high regard and has rightfully earned the respect of its readers.

Many of them have pointed out to us an item of reader interest that was recently overlooked. The special report, "Computer Output: Choosing the Right Method" [CW, Feb. 25] omitted any reference to Eastman Kodak Co.

Admittedly, Kodak is most well known as a manufacturer of photographic equipment and supplies. But Kodak also makes the excellent line of dry laser computer output microfilm (COM) devices known as Komstar microimage processors.

The integration of laser imaging and dry film convenience with on-line technology enabled the Komstar microimage processor to become the first COM device to be successfully put "on-line." In fact, Kodak has now become the unquestioned leader in on-line COM technology.

Richard C. Burandt
Business Systems Markets Division
Eastman Kodak Co.
Rochester, N.Y.

THE TAYLOR REPORT/Alan Taylor

Dual-Function Systems To Reduce DP's Authority

The announcement of Prime Computer, Inc.'s Office Automation System last month [CW, April 14] was both more and less newsworthy than it might have seemed. It was less newsworthy in that the system is not at all a new $200,000-plus hardware setup, but simply some $30,000 application software supporting two new extended-function DP terminals. But the system is more newsworthy because it uses the new terminals for non-DP *and* DP functions, thus both widening DP access capabilities and dangers. Dual-function systems of this type (which can be expected from other vendors too), will soon result in introducing non-DP users into equipment/software decisions.

Even now, a pure DP decision should take into account the future practicality of such dual-purpose systems. This new situation is bringing about a sharing of DP system costs with the office area.

Jim Hertenstein, Prime's product marketing manager, sees the DP role in decisions regarding this system — and potentially other joint DP/office systems or networks — as now being more that of a technical consultant and influential committee member. He seems to have put his finger on the future quite well.

The technical fact is that the greater usefulness of DP equipment — and its constantly expanding acceptance in non-DP areas — *must* reduce the previously exclusive authority of the DP department.

Noded Standard Network

The Prime systems are essentially a network with unusually simple-to-operate connections for attached computer, terminal and communications line nodes. They maintain easy compatibility with other systems both through the use of standard X.25 interfaces and through the use of IBM protocols.

The Office Automation System resides in one computer, using some 25K of extra memory, and in normal use supports about 10 in-use office terminals either by direct connection or through remote job entry. An import/-export utility provides for the changing of the format of the office-application files from their logical pages to or from any of the other file structures appropriate for data base and other DP systems. All of the systems are usable as normal by the DP users on the network.

So much for the view from inside the DP area.

But now, consider those users of the office terminals. There may be many more than 10 who can economically afford terminal and memory cost —

(Continued on Page 28)

READER COMMENTARY/Will Morse

Significant Spaces A Bad Idea in Fortran

The American National Standards Institute's (Ansi) X3J3 committee is not in the business of programming in Fortran. It is in the business of producing thoroughly unreadable documents. Like many standards groups, its members specialize in giving helpful hints to people who are more productive than they are.

We have endeavored to list some good reasons why spaces should not be significant in Fortran and to help the committee understand how inadequate this latest decision is [CW, April 7].

1) Large numbers may be split into groups of three to make them easier to read: 3.141 592 654.

2) Entities we call numbers that really are not, such as the so-called Social Security number, can also be split to make them more readable: 316 26 5772. Similarly telephone numbers: 316 265 7721.

3) Since there are only six characters in a variable name, abbreviations must be used. These are often more readable if they are split up. F OF X is more readable than FOFX.

4) Sometimes abbreviations that run together would not be obviously separable and therefore confusing. Credit Accounts Payable would be more understandable as CR A P than without the spaces.

5) It is often useful to space or not space statements to indicate meaning: (A+B) * (C*D + E).

6) FORMAT statements can always benfit from spacing. ///1H1////// would be more readable as : /// 1H1 /// ///. Of course, commas could be used, but that would really add as much confusion as if removed.

7) Spacing can be used for emphasis: D A N G E R.

8) Continuation is easier if you just don't have to worry about spaces.

9) There is no value to removing spaces. The example given in the article IF A GT B THEN as opposed to IF (A.GT.B) could better be solved by using the "greater than" sign for .GT.

10) People writing Fortran programs are often not programmers, but engineers or scientists. These people waste enough time counting commas without adding spaces to their burden.

11) Naturally, there is a large body of software in place that would need converting for no productive purpose.

12) A language already exists which does all this English-like statements nonsense and it, Cobol, has failed to produce better software. Instead, it has spawned such ungodly by-products as data base management systems, meta languages, precompilers, structured programming enthusiasts and PL/I.

(Continued on Page 28)

SOCIOLOGY OF COMPUTING/Robert L. Glass

Software Middleman: Fable of a Failure

You all know what a middleman is. He's the guy who obtains a product from one source and turns around and sells it to someone else.

In our complex society, there are lots of middlemen. In fact, we'd be hard-pressed to function without them. Store owners are middlemen. Stockbrokers are middlemen. Wholesalers are middlemen.

What has all of that got to do with computing? Well, now that microcomputers have become a retail business, quite a bit. But this is a software story. So what can the middleman have to do with software?

In software, there aren't usually very many middlemen. Most software products are either built directly for in-house use or are built for delivery directly to an outside customer. Once in a while, especially if software is part of a more complex system, it will be subcontracted by the system builder to a software house. Since the complex system is built for delivery to someone else, the system builder becomes, in effect, a software middleman. This is a story about one of those once in a whiles . . . and the role of a particular software middleman.

Out of Necessity

Whiplash and Screech is a company that designs and installs rapid transit systems. Those rapid transit systems can range in complexity from simple back and forthers, like the one in Tampa Airport's peoplemover system, to complex networks, like the ones which run all over the San Francisco Bay area.

Either way, they require software to drive the computer controllers which set the groundrules for the total system. And for complex ones, there are a lot of groundrules.

What Whiplash and Screech know about software could be stuffed in a card chip hole — and it would still fall out. So when they build modern, computer-controlled rapid transit systems, they subcontract the software part of the job to a software house. Voila! Whiplash and Screech are software middlemen.

Brent Sheepish works for Whiplash and Screech. He's the ranking software expert in the company (if you've been paying attention, you now know how good he is!), and is, among other things, the contract manager for software contracts. He is the Whiplash and Screech middleman, personified.

This is the story of a computing project which failed. You may be thinking, but how can a middleman — whose influence is obviously limited — be the cause of a project failure?

Whittling things down to the bare essentials, Brent Sheepish has just two jobs to do in managing Whiplash and Screech software contracts. He contracts with and monitors the performance of the software builder. And he contracts with and delivers to the institution wanting the software as part of the total system.

Obviously, then, all Brent has to do is keep those two contracts either identical, or at least in sync. And that's not so hard, right?

Wrong! For Brent, keeping those contracts in sync proved to be his downfall.

Complex Job

When Whiplash and Screech contracted with Open Spaces, Mass., to build an advanced municipal rapid transit system, it was the most complex real-time control system yet specified. Because of the complexity and the need for highly reliable and maintainable software, Brent Sheepish decided to require the use of a high-level language for writing the software.

That didn't cause anyone any heartburn. For one thing, Softpro, the company which won the competition to build the software, had a lot of high-level language experience. For another, Mayor Maynot of Open Spaces, who signed the contract, thought it would be great that the software for his system would be written in a language he might understand.

Using a high-level language meant having a compiler. That, Brent discovered, was somewhat more of a problem. The Little Wonder LW-80, which Whiplash and Screech had selected as the control computer for the system, had no compiler available for it. Well, actually, there was one — built in a university environment — but its interpretive executor was too slow for the timing constraints of the Open Spaces system.

Softpro, however, had some compiler-skilled people on its staff, and it happily added the compiler-writing task and the necessary lead time to the contract. (If you didn't already know this was a project which failed, you might be thumbing the pages to find a more interesting story by now, right?)

Mayor Maynot, nervous about the requirement for the compiler, leaned on Brent to write a really tight contract for it. Wanting to please his customer, Brent hired a consultant from a nearby university and specified that compiler to a fare-thee-well. Resource requirements, compilation times, object code efficiency and a host of other specifics were tied down. Both Brent and the consultant were deeply pleased with their thoroughness. And so, of course, was Mayor Maynot.

One Little Detail

It was not until Softpro delivered the first version of the compiler that Brent realized he had omitted one little detail. When he wrote that tight and beautiful contract, it was between his company and Open Spaces. It controlled the quality of the software he was to pass on to his customer.

He had neglected, however, to write

(Continued on Page 28)

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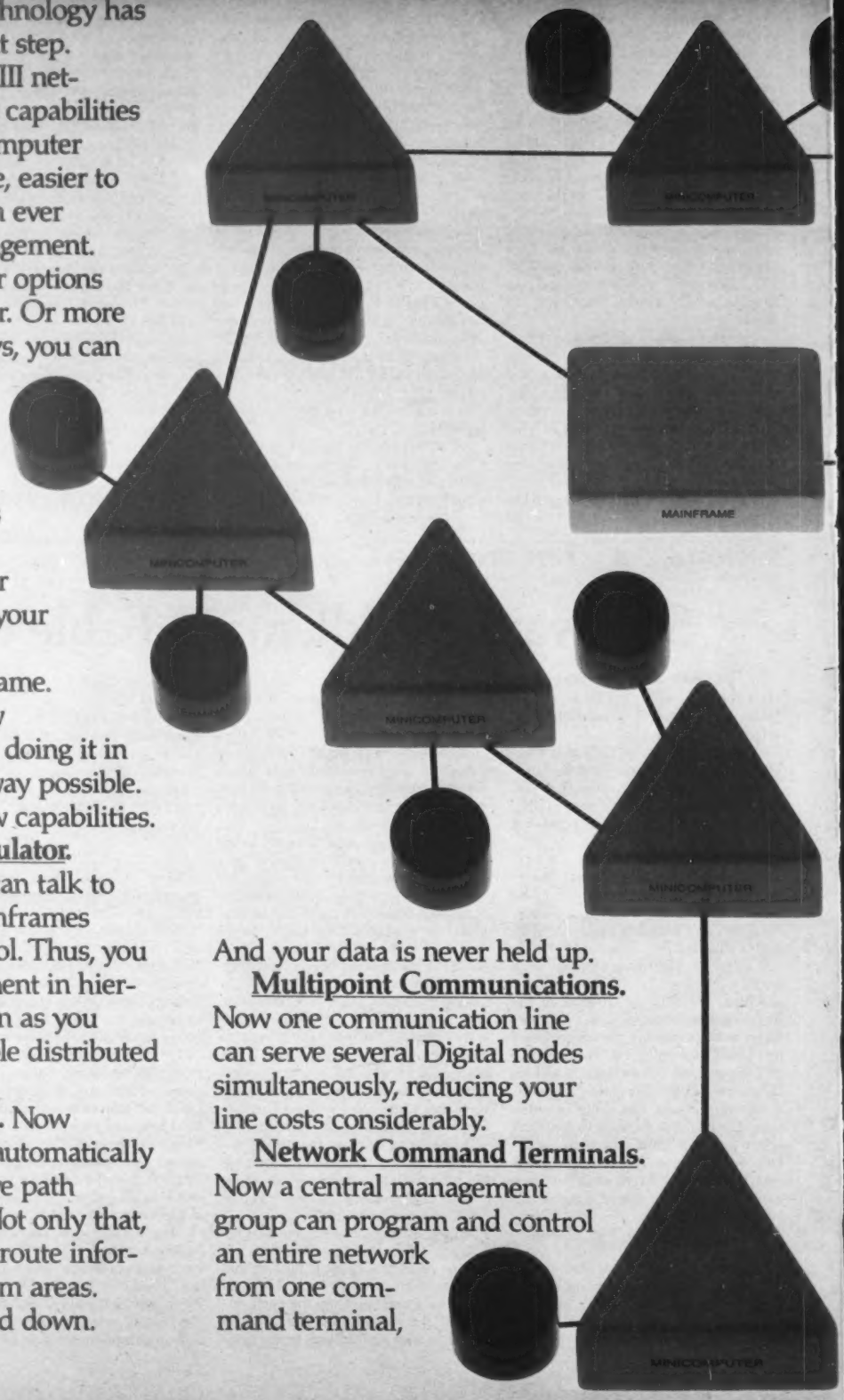

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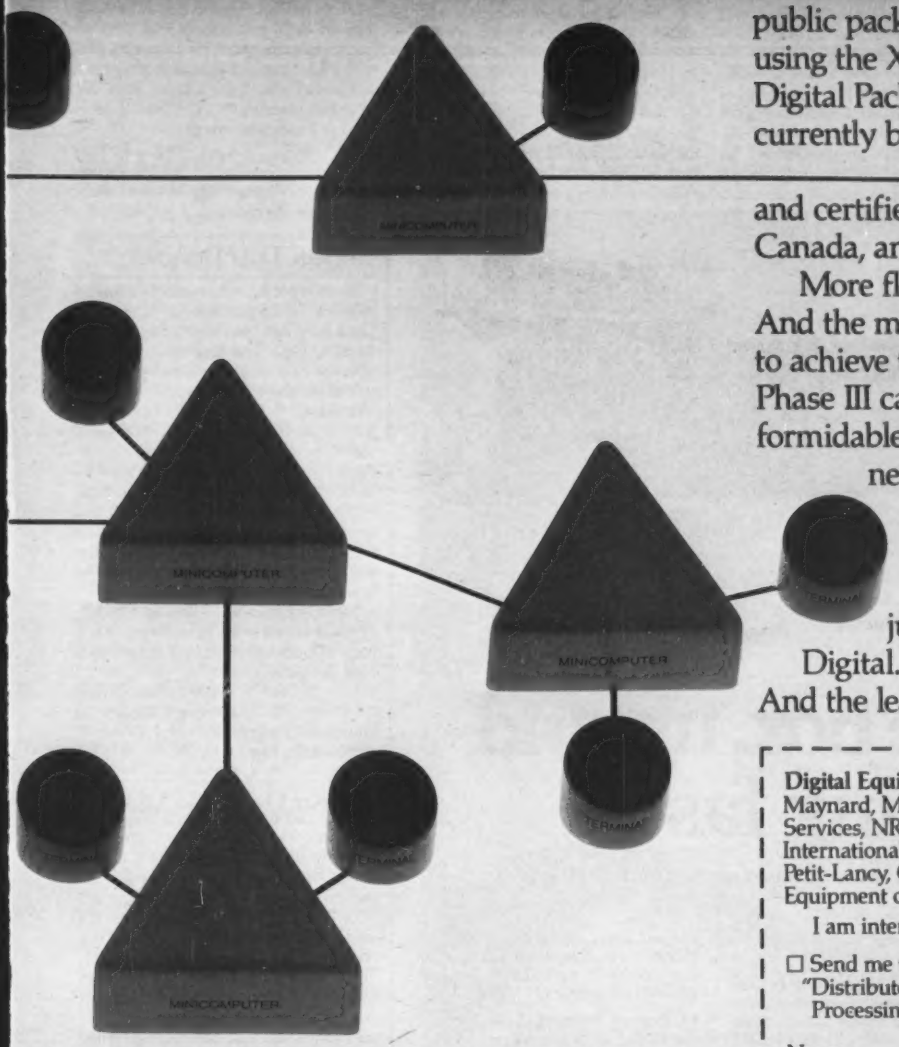

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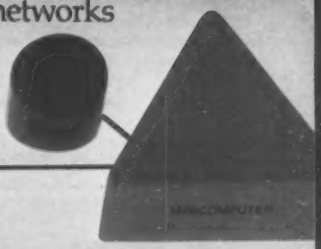

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LETTERS

Model Flawed, But Welcome

In "Human Resources Allocation" [CW, April 14], the authors made an interesting attempt to look at how to allocate human resources for a systems development project. Unfortunately, there are several deficiencies in the model that seriously impair its applicability to most real-world situations:

1. It does not account for one of the best-known characteristics of systems development projects, which is that the effectiveness of any individual is dramatically affected by the project size.

2. It treats everyone's skills equally; that is, a junior programmer can do the same categories of work as a senior programmer, although it will take longer. This characteristic leads to substitutability among the resource categories.

While the math looks a bit foreboding, the underlying assignment mechanism of the model is quite simple. Essentially, the most cost-effective resources (computer specialists, in the case used) are allocated first, up to the maximum amount available; then the next most cost-effective resources are allocated and so forth.

This leads to some intuitively unsatisfying results. For example, in the case demonstrated in the article, junior programmers (who are the least cost-effective) never get assigned at all. We certainly need to have a mix of skills on a project, in part for training purposes and in part for the types of tasks which are best assigned to such people.

3. The model concentrates on minimizing development *cost*, yet in many situations development *time* is the appropriate characteristic to minimize, especially for systems that have a favorable return on investment. One needs the flexibility to determine which of these is most appropriate and the tradeoffs involved (such as how much time could be saved if another $100,000 were spent on the development).

4. The model needs to be extended to a multiproject environment, in which a priority can be assigned to each project (perhaps based on its ROI). Of course, with the model in its current form, the top priority project would consume the best resources until it was staffed, the second priority project taking the best of what's left over.

But this can't be reasonable, because lower priority projects would not have a sensible staff mix. Worse, if the junior programmers were the most cost-effective, the highest priority project could be composed solely of junior programmers for coding and implementation (the model precludes the use of junior programmers during design).

At the American Management Systems, Inc. computer center, we have available an excellent project-costing model called Slim, which does effectively address the first and third items above (as well as many other items, such as risk analysis, major milestones, rate of code production and CPU resource consumption for development).

The allocation of people to projects is a fruitful area for analysis, however, and the contribution of Elwood Jones et al is a welcome start.

Fred L. Forman
Vice-President
American Management Systems, Inc.
Arlington, Va.

On 'Data Designer'

It was a pleasure to read the comprehensive In Depth article "Canonical Data Base Analysis and Design" [CW, March 17]. The material was obviously well researched and presented in a readable, succinct manner.

However, I would like to point out that Data Designer is the proprietary software design tool of Database Design, Inc. (DDI). Founded in 1979 by James Martin and Dr. Robert Holland, DDI is a software development and consulting firm that specializes in data base design software and methods, design workshops and seminars and data base management planning.

Data Designer is the first in a family of planned software products that will fully support present and future data base design efforts.

Arlene Chmielewski
Marketing Coordinator
Database Design, Inc.
Ann Arbor, Mich.

Your Own Gold Mine

Imagine waking up one morning and realizing that your own personal gold mine exists nearby and is virtually an endless resource for you.

Well, entry-level programmers are graduating from business and technical schools all around the country. These schools are untapped gold mines where corporations can find computer programmers who have financed their own education and taken comprehensive training. Graduates of these schools have hands-on training which includes the writing of practical business programs, documentation of these programs, debugging and successful execution.

A few students at these schools have attended liberal arts colleges and found they were not satisfied with the salaries their bachelor's degrees brought. Most of the others students are people who have gained expertise in the business world, but realize that DP is the wave of the future.

Far too often, a graduate of a tech school must hunt far and wide to secure an entry-level position. Most companies would pay a salary of $15,000 to $18,000 for a programmer who has become disenchanted with his environment rather than take a chance on a technical school grad who is full of enthusiasm.

(Continued on Page 27)

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DATAPOINT

(Continued on Page 26)

Wake up! Here's your gold mine. The entry-level programmer is the most valuable asset a company can have, for as he grows with your technology and training, he has a foundation for challenges yet to come.

Call a local tech school and speak to a career counselor.

Mom always told me that two heads are better than one. You can get two entry-level programmers for the price of one with three years' experience (at $24,000 a year). With a structured program, you can develop these programmers for your organization and have a healthy, happy, loyal DP department.

(I recently graduated from the Computer Processing Institute of E. Hartford, Conn., and am now employed as a programmer.)

Stan Kupiec
Middletown, Conn.

LETTERS

Time for Consumer Action

Regarding the "pseudo-fraudulent" practices that seem to be prevalent in our industry (and probably most others): Why do we, the end users, sit back and allow them to happen?

Are we not all consumers? Then let us act as responsible consumers. We have the power, en masse, to influence the present performance and future directions of any product manufacturer, whether it be on the domestic front or on the foreign. Why then do we sometimes get indignant on an individual basis over some injudicious practices on the part of some manufacturer, but never seem able to quite mobilize as a group to actually "hit them the way it will hurt"?

Let me illustrate my point via an example from outside our industry. Were you, as a consumer, to walk into a hardware store and purchase a remote-controlled television, you would rightfully expect the television to respond to commands from the remote controller upon arrival, unpacking and initial use in your home. You would not settle for less, because you bought the item based on its advertised features; it should live up to them. The result would be your returning the television for free repair, for a different set or for your money back.

Now contrast the above scenario with this actual, and not too rare, one. My company's DP operations are based on the new generation of microcomputers. We utilize a popular, commercially extended, dialect of Basic for our applications programming under Digital Research, Inc.'s CP/M operating system.

Having purchased a version of this high-level language two years ago and written very successful applications with it, we were naturally interested in the newer and greatly enhanced versions being advertised a little more than a year ago.

The newer version was purchased from a large East Coast distributor of microcomputer software. Upon its arrival, we were on our way to bigger and better things, or so we thought. That's right, there were some catches. Most of the new and exciting features, when tested out, did not perform as per their advertised abilities or the manual that came with the software.

Complaints to the distributor resulted a few months later in the procurement (at no charge) of a version to correct these inherent bugs. Surprise, surprise — the newer version corrected the problems by omitting the features at fault from the language completely. What future version was the manual supposed to represent?

Our patience was wearing thin, so we gave up (conformed?) and shut up, electing instead to program around the bugs inherent in the first enhanced version. Some very successful software resulted, but at a cost, since as each bug was confronted, solutions for programming around it had to be devised; a rather brute force method.

The situation remained static until recently when I noticed that a yet newer version had been released. Could this be the version that would finally show the manual to be an accurate representation of the language? I can't supply you with the answer because the distributor expects a $25 fee for furnishing me with this newer version.

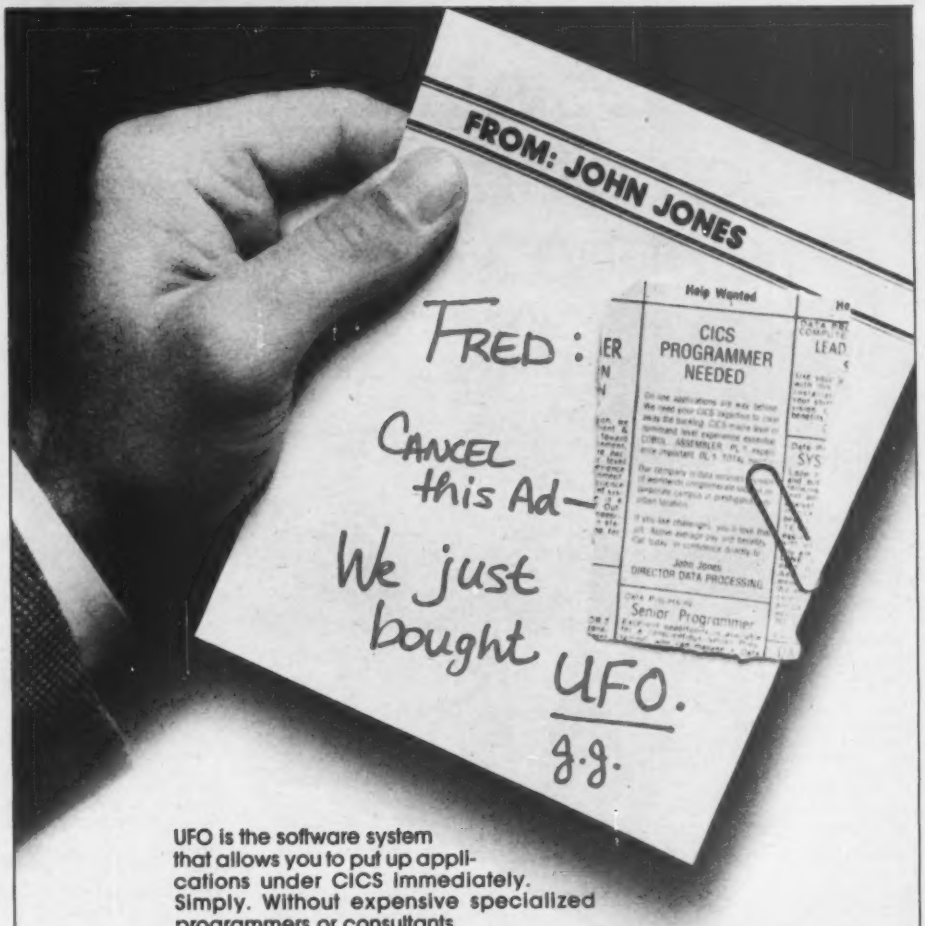
Why do I have to pay any further fees for a product I thought I had paid for a year ago? Caveat emptor, perhaps, but I just can't rationally cope with this sort of nonsense and exploitation; I must complain!

The distributor tells me that the fee is necessary because of labor costs. But what about my costs, and besides, why should the consumers subsidize the mistakes of others?

I exhort all those other indignant consumers "out there" to get in contact with me. Perhaps, together, we may put an end to these practices that strip us of our rights!

Geoffrey S. Shapiro
DP Manager
Adams Warehouse Corp.
Hoboken, N.J.

'... And the Quality Assurance on This System Is Brutal. We Just Let Our Salesman Carry It Around in His Car for a Week.'



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Significant Spaces a Bad Idea for Fortran

(Continued from Page 23)

13) Making a programming language English-like is a silly dream. We use algebraic notation because 2.7182818 is easier to work with than "two and seven million one hundred eighty-two thousand eight hundred eighteen ten millionths," and the Greek letter epsilon (e) because it is easier to work with than 2.182818. We use $ rather than "dollars" because it is less confusing.

For the same reason, we use "non-English-like" programming languages because we are solving a problem for which the best description is in an unambiguous procedure-oriented language. It is every bit as legitimate as proofreader's symbols on a draft.

In fact, the very similarity of English to a programming language is a source of confusion. How many beginning COBOL programmers have tried to READ ALL THE-CARDS, or PERFORM PARAGRAPH-A AND PARAGRAPH-B? Similarity to English is of no help to the beginning programmer because it is confusing, and the experienced programmer will learn the proper method, English-like or not.

The original article used the term "ASSIGN statement" for what is really an "assignment statement." An ASSIGN statement is really something else entirely. This mistake resulted from confusing a Fortran operator with an *English word*, not from confusing two Fortran operators.

There are many serious disadvantages to having a programming language too English-like.

14) The fact of the matter is that programmers, not programming languages, create meaningful code. If all the variable names in a program are arbitrary strings of Os and zeros, no amount of spacing or nonspacing is going to make it any more readable. That is why PI/I, Pascal, Cobol and whatever other language you care to name have failed to produce a solution to the problem of meaningful, readable documentation. A good assembler programmer can write just as meaningful code as anyone writing in Cobol.

Morse is a data communications project manager based in Wichita, Kan.

DP's Authority to Change

(Continued from Page 23)

even if part of the mainframe costs are included. The limitation of 10 is simply related to the number in use simultaneously and clearly is only a temporary limit. And all these office-terminal users can benefit from data base access, using easily accessible programs.

So, there is little doubt that when corporations decide to pay for electronic mail, text editing and so forth, the office users are going to become a new type of computer insider with as much access as other terminal users such as programmers and analysts.

This influx of new users who will want painless access to the benefits of DP can make ease of access for non-DPers the key requirement in selecting one piece of jointly usable resource, software or application. And that puts the non-DPer in the driver's seat, for he can say what he needs to understand.

All this is bound to change the DPer's approach, but unless he can really prove that he should be isolated from the other electronic services that are going to be purchased (and then expanded, thus creating a second competitive DP environment), there seems no reason for the DPer organizer to object to the new trend.

However, one thing should change. In future products which help the non-DPer cope with his office work, using the skills and equipment made possible by years of hard work by DPers, hopefully someone will think it only reasonable to provide the DPers with the office work assistance that documentation, design and analysis need. After all, we are managers and administrators just as much as the others!

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Middleman Puts System on Rocks

(Continued from Page 23)

an equally tight contract with Softpro. The compiler he got from them was of high quality — but not nearly as high as the one he'd committed to deliver!

The result, of course, hit the proverbial fan. You don't renege on a contract in the public sector without the press getting into the act. By the time the *Open Spaces Clarion Call* finished with Brent Sheepish and Whiplash and Screech, the sting of the public wrath had pelted them like a sandstorm in Saudi Arabia.

Being a software middleman ought to be an easy, carefree job. But for Brent and his management, the word carefree didn't ever make it into the job description. He had violated the software middleman's prime concern — keep the contracts in sync.

The moral of the story? Even a software middleman needs software skills. And a goodly dose of contractual common sense thrown in!

HUMAN CONNECTION/Jack Stone

Reader Sees New Breed of DPer in Exec Roles

You may have noted in a recent edition of *Computerworld's* Q&A column that readers generally believe that the most serious problem in the business today is the lack of proper DP training [CW, April 14]. I don't happen to agree with this assessment, or at least with the way it's phrased.

Sure, we have serious training problems, but the training situation is only one part of the greater, more significant problem, which is the need for a new — or changed — breed of DP manager to better integrate the information systems function into the organization. (I fully expect this remark to encourage some DP managers to write in about the need for a new — or changed — breed of industry writer.)

"Training" has become the "standard bucket" into which DPers toss all matters dealing with the human problems of the business. For example, if you should poll DP managers as to how they get along with their top executives, I'll wager that 98% of them will answer, "I don't and it's because my execs don't have the necessary DP training." And it hardly matters whether the issue relates to users or staffers or vendors. If there is problem in communications, human relations or politics, then it's always the other guy who needs a good strong dose of "DP training." And it is this sort of attitude which illustrates why the industry needs a new breed.

Bill Delaney, president of Analysis & Computer Systems, Burlington, Mass., feels that the breed will grow and nourish. He writes:

"Your article in the Jan. 14 issue of *Computerworld* concerning management maturity in the 'software business' discussed a very pertinent and important aspect of our growing industry.

"Your suggestion that DPers be elevated to executive or decision-making levels, is, in my opinion, the best solution, but it is a long way from happening. It will come in time, because it has to happen, but change comes slowly.

"When large hardware/-software systems had a 90%/-10% ratio costs, it was reasonable that the senior staff be from the hardware or engineering ranks. As hardware costs have steadily and dramatically declined while software costs have steadily and dramatically climbed, we see the hardware/software cost ratio today at approximately 40%/60% with software being the greater cost. Future estimates and predictions (with which I agree) project this cost ratio to rise to 15%/85% or even higher.

"As it becomes more and more apparent to the 'top brass' where the major costs and expenses lie, it eventually follows that people with expertise in that area (analysis/-software) will be given the senior status in the operation, because of the sheer necessity to do it in a cost-effective manner.

"The problems you mentioned (short fuse schedules, unlimited and uncontrollable overtime, recoding or badly designed software and absence of adequate documentation) all stem from one primary fact. The people in overall control were, very likely, hardware people with no experience with software.

"These people, very often, consider coding to be all that is required to do the software. Since coding is only 20% to 25% of the entire job, then unanticipated added costs always follow, and they are blamed on the 'software people' who had little or no say in the original plan, schedule and costs in the first place.

"I agree that the 1980s will show the elevation of DPers into higher level decision-making or advanced planning roles, but it will be the result of sheer necessity in most cases. However, it is long overdue."

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From Idea to Profit — Part 1

Software Authors Should Define Market

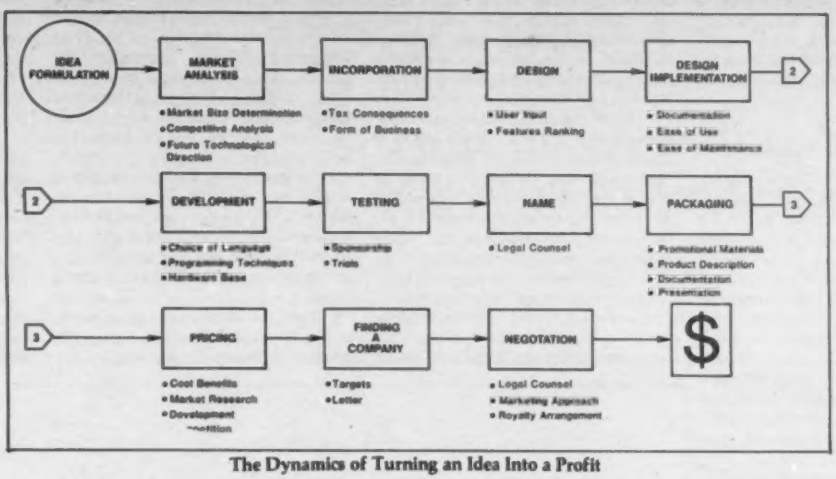
By A.L. Frank
Special to CW

Many a creative programmer has kicked around an idea for a software product. But most of these ideas do not see the light of day because the programmer is intimidated by the headaches involved in turning an idea into a profit.

This is the first installment of a five-part article on how to bring a home-grown software product to market. Part 1 gives advice on identifying and surveying the market. Next week: how to become a business.

While some ideas get off to a running start, they may end up disasters because the creator underestimates the time, money, legal requirements, packaging and marketing techniques that are needed.

Other ideas, however, turn into financially successful and personally rewarding projects. This article will discuss the steps that must be taken and the traps to be avoided to profit from a home-grown software product.



The Dynamics of Turning an Idea Into a Profit

To deal with the complex dilemma of, "How do I design, develop and package my own software product to reap financial rewards?" an aspiring software author must develop an organized plan for at least the following areas:

- Developing an idea.
- Analyzing the market.
- Becoming a business.
- Designing the product.
- Implementing the design.
- Using development techniques that will benefit the buyer.
- Testing the product.

(Continued on Page 32)

Tops-20-IV Offers 23 Enhancements

MARLBORO, Mass. — Digital Equipment Corp. brought out a version of its Decsystem-20 operating system that offers 23 enhancements over the previous release.

User-level features added in the new version, Tops-20-IV, are:

- Support of the PDP-11-based remote job entry (RJE) station, DN200, to allow PDP-11 hardware to serve as RJE stations to a Decsystem-20.
- Support of IBM's Houston Automatic Spooling Program (Hasp), an SVS operating system extension that supports job, data and task management functions as well as remote job entry.
- Execute interface to Cobol 68 and 74 compilers.
- Decnet task-to-task support at the Phase II level. A Decnet Phase III interface for Tops-20 has not been released yet, a DEC spokesman said.
- An execute-only file protection feature that allows users to label files to be run only and not copied or read.
- A file archiving system.
- Arpanet protocol.
- Improved asynchronous terminal support. According to the spokesman, overhead has been reduced through better XON/-XOFF handling.
- Ansi tape label support.
- Support for the TV editor, a screen-oriented editing program that is based on DEC's TCO, the standard Tops-10 and Tops-20 editor.

At the operator level, Tops-20-IV is also said to offer an integrated operational environment, improved magnetic tape utilization and dynamic recognition of MOS memory and disk and tape drives.

Through dynamic recognition of MOS memory, the operating

(Continued on Page 33)

Honeywell On-Line System Fits Manufacturing Tasks

WALTHAM, Mass. — A modular on-line transaction-oriented manufacturing system for Honeywell, Inc. medium- and large-scale CPUs was announced by the vendor.

Said to enable manufacturing management to plan and coordinate resources from initial raw materials orders through the production phase, the Honeywell Manufacturing System (HMS) uses integrated inventory and production and control capabilities, the vendor said. HMS reportedly facilitates building and maintaining all inventory and production information in a single data base.

In addition, the data base reflects the interrelationships and associated costs of production and inventory and gives management up-to-date information on the total manufacturing picture,

(Continued on Page 34)

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Aspiring Software Authors Should Define Buyers

(Continued from Page 31)

- Naming and packaging the product.
- Pricing the product.
- Approaching a company in order to sell the marketing rights to the product.
- Negotiating the sale.

Defining the Buyer

An important decision that the developer must make early in the game is how and to whom he plans to sell the product. It is necessary, then, to define "the buyer."

Normally, the end user is thought of as the potential buyer. Many programmers have attempted to form their own companies to develop and then sell software products on the open market. However, even in the late 1960s and early 1970s when venture capital was available to build a professional software organization, few were successful.

Why? The major stumbling block facing a fledgling company is creating a marketing organization that can penetrate a geographically broad marketplace. For example, many companies have discovered that product income will not cover the cash drain required to operate three or four branch offices.

Today, however, enough software companies have been successful to create a very viable alternative to forming one's own marketing organization — developing and selling a product or its marketing rights to a software company with a marketing and sales force in place. This article will explore that particular approach — where the buyer is a software company.

Words of Caution

A few words of caution first. The most outstanding idea in the world is probably doomed if the author does not first determine whether there is a market for the product. Moreover, a marketplace can easily disappear in the time it takes to develop an idea. So a developer must conceive of a software product that is based on tomorrow's market needs.

Insufficient time or money can also turn a great idea into a nightmare. An author should realize that he will have to commit his own time and probably his own financial resources to developing the product. Development of a software product on a part-time basis is often unsuccessful.

The developer should be sure that his development time is, in fact, his own. If an employee of a company develops a product while working there, that organization may claim some rights to it.

This is particularly true if the company's computer facilities are used. Therefore, a developer should certainly not devote any of his employer's time or resources to developing his own product unless he has a formal release assuring him of sole ownership.

Similarly, if a user company develops a product it decides to market, the organization must be certain its proprietary rights are maintained by judicious use of employment and confidentiality agreements.

These words of caution are not meant to intimidate a potential developer, but to stress that he should carefully weigh the implications of each decision he makes throughout the process of developing an idea into a profitable product.

To transform a good idea into a valuable entity, the creator must become a marketer, that is, one who can identify the marketplaces for a product and determine just how that product will fit in. This is different from being a salesperson who, once a viable market is found, can go in and sell the product.

Before turning his idea into code, the author must undertake his first job as marketer — determine the size of the market, or how many users would conceivably want to buy the product. This is best done by a market survey.

It is important to realize, however, that a market survey should not only reach a reasonable number of potential users, but also target those individuals who are at a decision-making level within an organization.

Several companies publish lists of computer executives including Phoenix-based Applied Computer Research, Inc., Computer Intelligence Corp. in San Diego and International Data Corp. in Waltham, Mass. These lists can provide a good base from which to sample.

A market survey aimed at executives should be brief and concise. Remember, it is not a sales tool, but rather a means for determining the market size. Therefore, the survey should, at a minimum, ask the following questions:

- Does the computer configuration of this particular installation allow the product to be used?
- What does the installation currently use to perform the proposed product's functions?
- Does the company have money budgeted for this type of product?
- Would the company like sales literature when it becomes available?

Gauging Competition

In addition to surveying the market, a competitive analysis should be done. The International Computer Program, Inc., Auerbach Publishers, Inc. and Datapro Research Corp. publications, as well as numerous computer trade journals, can be used to determine if there are competitive products and what their features are.

Assuming there are competitive products, it is important to determine

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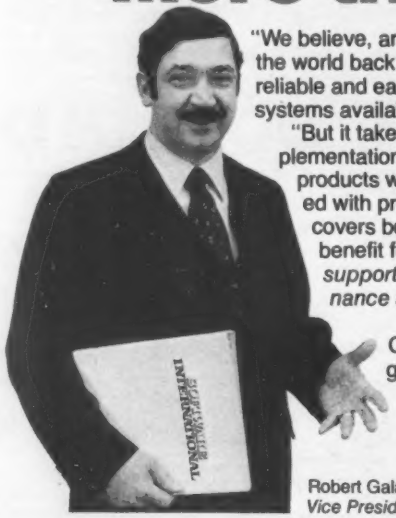

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Before Bringing Home-Grown Product to Market

if a sizable market share remains for the proposed market. If other products already have 50% of the market and the proposed product will take two years to complete, then development would not be wise.

To gauge further both the marketplace and the competition, the developer should not hesitate to directly contact a company with a competitive product. Most organizations will respond to almost any inquiry with public domain information, but the author should be careful not to mislead his future competitors by claiming to be someone other than who he is.

The safest way to get leads from a potential competitor is to be straightforward. The author should explain that he is planning to develop a product in this area and would like to know something about the competitor's product to determine whether this effort is worthwhile.

In some cases, expect to be laughed off the phone; in others, people will volunteer general information.

Other sources for evaluating a potential marketplace include the Share and Guide organizations for IBM technology and the users' groups of various other vendors' products.

Future Direction

In addition to considering existing products, markets and technology, the developer must forecast the direction of future technology. For example, if it will take a year and a half to develop a system that interfaces with IBM's current data base technology and that technology is projected to change within two years, development obviously is not worthwhile.

The possibility of early obsolescence resulting from unforeseen changes in technology is a risk that must be carefully investigated; it is a major reason for lack of products' success.

Frank is an attorney and the director of corporate development at Boole & Babbage, Inc. in Sunnyvale, Calif.

Tops-20 Operating System Provides 23 Enhancements

(Continued from Page 31)

system's monitor will automatically respond to memory errors and take failing memory off-line, the spokesman claimed.

In addition, whenever a disk or tape drive is added to the system configuration, the monitor will create the necessary internal data base to allow these new devices to be accessed by time-sharing users. This dynamic recognition, the spokesman added, will take place without having to reload the Tops-20 monitor.

Added at the site administrator level were such features as a program name cache, working set swapping capability, accounting improvements, an access control mechanism and three scheduler controls — bias, class and priority.

System Reporting

System reporting was enhanced via a Watch program that prints out seven more performance characteristics than the earlier Tops-20 produced. These include working set size of each job, number of page faults taken by each job, average time to satisfy page faults, active swapping ration of the system and disk seeks, reads and writes per spindle.

DEC also reduced scheduler overhead by cutting down the number of characters and conditions that activate the scheduler to poll a terminal and added new error logging routines including event logging from the Decnet front end and text entries from the operator's REPORT command.

Finally, Reliability and Maintainability Program (Ramp) features were improved by, for example, adding diagnostic information in the error output, the spokesman noted.

Tops-20-IV uses 10K words more than the earlier Tops-20-3A release a year ago. The latest release will run on the minimum 256K-byte Decsystem-20 configuration, he added.

Post-warranty Decsystem-20 users not currently under a maintenance contract can purchase the Tops-20-IV update for $3,693 without service. For maintenance, these users must pay an additional $2,462/year or $216/mo for the Binary Product Update Service (BPUS) contract.

Tops-20-IV is available from DEC at 200 Forest St., Marlboro, Mass. 01752.

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CW5580

Fortran Translator Runs Under DOS/OS

BUFFALO, N.Y. — Dataware, Inc. has introduced a Fortran-to-Fortran translator for IBM 360 and 370 series CPUs running under the DOS/OS operating system.

The conversion routines is a high-level, multiple-pass syntax translator that is said to provide a standardized approach to conversion by automating repetitive changes.

Major components of the translator include a Fortran statement scanner, precompiled interpreter logic tables, an interperative analysis executive and a Fortran statement formatter, according to the vendor.

Multiple programs or subroutines can be batched as a single input stream if predefined in the conversion specifications. Output from the translator includes an original Fortran source listing along with the converted Fortran source program in an 80-col card image.

A worksheet listing of the converted Fortran program is also included. That listing highlights statements that have been converted, deleted or inserted as well as output diagnostics aid messages, Dataware said.

The Fortran-to-Fortran translator is written in ANS Cobol and requires a minimum of 100K bytes of memory. The package costs between $5,000 and $15,000, Dataware said from 2565 Elmwood Ave., Buffalo, N.Y. 14217.

Over IBM's Idcams

Vsam Catalog Utility Saves Paper

SPRINGFIELD, Mo. — Listcat Plus, a program that prints an analysis of Vsam catalogs, is said to offer a 30:1 paper savings over the report produced by IBM's Vsam catalog utility, Idcams.

Available from MacKinney Systems, Listcat Plus prints two reports. One shows the status of each data set printed in data set name sequence; the other summarizes the status of each volume.

The latter report shows the space allocated to Vsam, how much of the space is allocated to data sets, how much of the space allocated to Vsam data sets is unused and how much total space is unused.

The program is distributed in Cobol source code for a one-time charge of $99 from MacKinney, 1412 E. Locust, Springfield, Mo. 65803.

'Report Writer' Fits Micros

HICKORY, N.C. — The Report Writer for 8080, 8085 and Z-80 microprocessors with 48K bytes of memory is available from Carolina Business Computers, Inc.

Report Writer, designed to eliminate the process of compiling information into a ledger sheet, separates information into a series of rows and columns.

The package costs $150, the vendor said from Oakwood Center, 350 Third Ave. N.W., Hickory, N.C. 28601.

Manufacturing System Unveiled

(Continued from Page 31)

Honeywell noted.

The on-line system operates on an exception basis — meaning only the data affected by a change is processed, which is said to simplify both transaction processing and data base maintenance.

HMS accepts externally generated customer requirements, develops a master production schedule and resource plan and schedules necessary materials supply. Through system-initiated feedback documents, it also schedules and monitors production resources.

HMS also offers a set of functions to help solve materials control and scheduling problems and to maintain an efficient inventory operation.

Modular Subsystems

HMS consists of six modular subsystems that integrate the total manufacturing package. These modules are:

- Inventory Record Management (IRM), which provides basic inventory accounting capability and includes data base initialization, material item maintenance, cost maintenance, perpetual inventory and record maintenance.
- Manufacturing Data Control (MDC), to establish and maintain product structures and production processes.
- Material Requirements Planning (MRP), which provides for net change materials requirements planning of selected material items.
- Statistical Forecasting (STF), to forecast future demands.
- Master Production Scheduling (MPS), said to help management establish a master schedule that plans production rates and materials requirments to meet business objectives.
- Capacity Requirement Planning (CRP), which provides capacity requirements planning and shop floor control.

The HMS modules are available on a monthly license or for a one-time pay-up license. A typical monthly fee would be $1,000, while the pay-up license costs $50,000.

HMS will be available in the second quarter of 1980, with most deliveries in late 1980.

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BACK AT WORLD COMPUTER CENTRAL, MANAGER OF MIS JAQUIN JORDA ANXIOUSLY AWAITS WORD FROM HER CURIOUSLY TRANSFORMED DATA PROCESSING MANAGER. HE IS CURRENTLY IN A COMPUTER SYSTEM SOMEWHERE BETWEEN AMERICA AND RUSSIA. SUDDENLY...
MESSAGE FROM ADAM: SET UP SATELLITE RETURN 0700 YOUR TIME VIA GENEVA. PATCH OUTPUT TO WHITE HOUSE. THANK GOD HE'S ALL RIGHT.
MULDER & TIEDEMANN
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MEANWHILE, JUST AS THE RUSSIAN OPERATOR CUTS POWER TO THE DISK DRIVE, CAPTAIN INFO MAKES HIS EXIT HAVING STORED THE VITAL INFORMATION HE NEEDS IN HIS BRAIN, NOW CHARGED WITH THE POWER OF A 128K RAM PROCESSOR.
BACK ON LINE AT LAST. HOPE JJ HAS DONE HER STUFF... WILL BE HOME IN A JIFFY.
PETERSON, I THOUGHT I WAS GOING TO HAVE INFORMATION THIS MORNING... I'VE GOT A SERIOUS DECISION TO MAKE.
IT'S COMING ACROSS NOW, MR. PRESIDENT.
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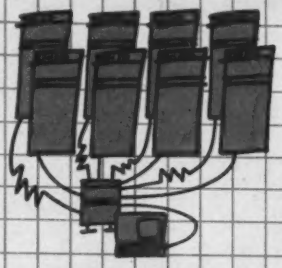
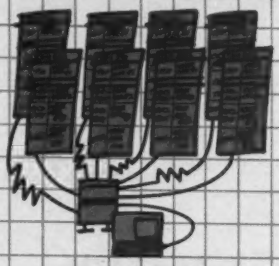
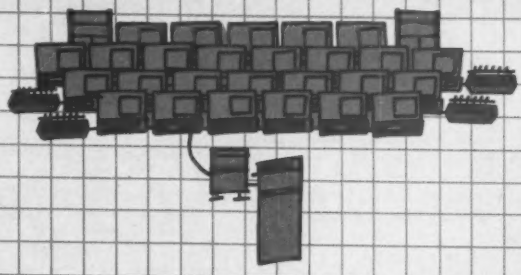


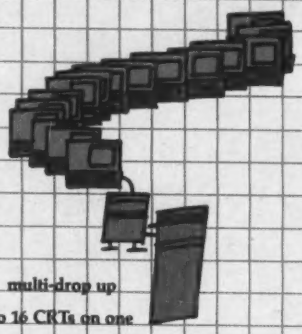
access up to eight IBM host computers, either local or remote, from a single terminal



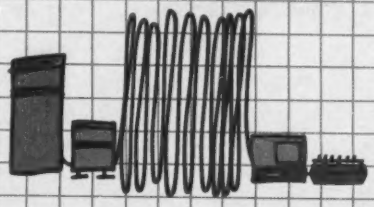
access up to fourteen partitions —with up to eight partitions per host— from a single terminal



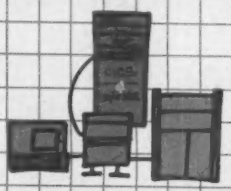
control up to 32 peripherals (card readers, CRTs, printers and disk drives) with a single system



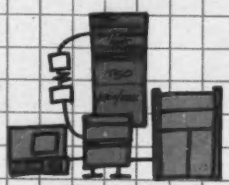
multi-drop up to 16 CRTs on one coax to save cable



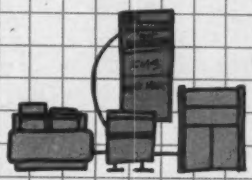
do local processing up to 7,500 feet from the host computer and save remote connection expense



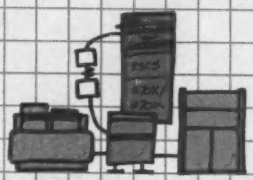
assume the software transparent identity of multiple IBM systems with a single computer/controller and look like... a local interactive communication system



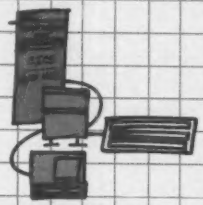
a remote interactive communications system



a local job entry system



a remote job entry system



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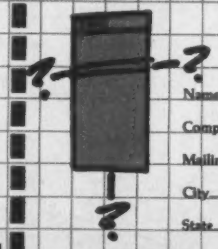

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NBS Offers Handbook for Lonely Programmers

WASHINGTON, D.C. — The National Bureau of Standards (NBS) is offering to the programmer who works alone with limited resources a handbook to help assure the quality of his software.

"Testing, validation and verification of software is a difficult and arduous task even for a manager with automated tools and sufficient people to devote to the task," according to the handbook written by the Center for Programming Science and Technology of the NBS Institute for Computer Sciences and Technology.

In an environment in which all the management is done by the programmer himself, "specialized" assistance is required, the publication pointed out, emphasizing verification as "an integral part of software development."

The development and planning of testing procedures and the application of other verification techniques at each life cycle stage are covered to assist applications programmers doing small development projects.

Using Limited Resources

Concentrating on "inexpensive verification and testing techniques," the 22-page publication offers advice to the programmer on several steps in developing programs with limited resources, including:

- Investing in analysis at the beginning of the project. NBS suggests that the programmer analyze not only what the program is to do, but what the input will be like: form, format, data types and units for input.

Also, the programmer should consider how exceptions, errors and deviations are to be handled, as well as the computer environment required or assumed.

- Starting to develop the test set at the requirements stage. Data should be generated that will determine if the requirements have been met.
- Analyzing for the correctness, consistency and completeness of the requirements during this initial stage.
- Writing an explicit design statement.
- Determining if the code is consistent with the design.
- Performing tests in an organized and systematic manner. Test runs should be dated, annotated and saved.
- Asking a colleague for assistance. Additional manual analysis of the code should precede the first test runs. The manual notes, however, that "usually programmers are poor at finding their own errors."

An independent party, usually a colleague, should be asked to analyze the developing product at each stage — the requirements, the design and the code. "The programmer should explain the product to his colleague while the colleague plays devil's advocate."

- Using available tools. The programmer should be familiar with the various compilers and interpreters available on his system.
- Applying stress to the program. Testing should exercise and stress the program structure, the data structures, the internal functions and the externally visible functions.
- Testing everything separately. "Only after the pieces have been found error-free are they joined together, one at a time, and tested as a unit."

Validation, Verification and Testing for the Individual Programmer (No. 003-003-02159-8) is available for $1.75 from the U.S. Government Printing Office, Washington, D.C. 20402.

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*Material Requirements Planning, a component of Cincom's Closed Loop Manufacturing System.

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'Finds' Supports VS Scheduling

BROOKFIELD, Conn. — The File Independence System (Finds) reportedly offers IBM DOS, DOS/VS and DOS/VSE users greater scheduling flexibility by dynamically allocating a sequential disk file where a tape file is normally required.

Finds can also dynamically use tape in place of disk for sequential disk files, according to its vendor, Universal Software, Inc.

Allocating or processing a sequential disk file for a program that normally uses tape requires that the appropriate DLBL and Extent information be included in the jobstream, the vendor said. Similarly, to allocate or process a tape file for a program that normally uses sequential disk, TLBL information should be included.

Targeted for configurations that are low on tape or disk resources where job scheduling may depend on drive availability, Finds rents for $85 a month from Universal Software, Inc., Brookfield Office Park, Rte 7, Brookfield, Conn. 06804.

Utility Cuts Storage For RPG-II Programs

LYONS, Ill. — IBM DOS/VS and DOS/VSE users reportedly can reduce the amount of core image library space required by RPG-II programs with a software utility from General Electronics.

Mizer reduces each RPG-II program's storage requirements by more than 5,000 bytes, the vendor claimed. This means that an installation with a library of 300 RPG-II programs can save more than 127 tracks of an IBM 3330 disk drive, the company added.

Available on a 30-day trial, Mizer costs $50/mo or $1,200 for a three-year license from General Electronics at P.O. Box 79, Lyons, Ill. 60534.

Runs Under SNA

Raytheon Data CRT Emulates IBM 3278s

By Brad Schultz
CW Staff

NEW YORK — An intelligent CRT terminal intended to serve in small clusters as a replacement for IBM's Model 3278 is available from Raytheon Data Systems Co.

The PTS-2000 will stand — 14 in. high — under IBM's Systems Network Architecture (SNA) umbrella to give large IBM commercial users an alternative to IBM's 3270 terminal family, a Raytheon Data spokesman said.

The 35-lb. user-installable PTS-2000 is more compact, intelligent and expandable as an emulator of IBM's 3276 communications protocol than any other 3270-type network terminal, he claimed.

Billed as the cornerstone of Raytheon Data's product line for the 1980s, the PTS-2000 offers screen size of 960-, 1,920- and 2,560 char. and runs as fast as 7,200 bit/sec.

That should suit message switching, query/response and word processing (WP) applications as well as conventional DP, the spokesman asserted. And Raytheon Data will announce a 3,440-char. format in September along with speed extension to 9,600 bit/sec.

Already supporting IBM's Bisynchronous and Synchronous Data Link Control (SDLC) protocols in small cluster arrangements, the PTS-2000 will gain Bisynchronous and SNA emulation of large-cluster (up to 32-station) 3274s this fall, the spokesman indicated.

Raytheon Data has reportedly sold the terminal in West Germany for nine months now and can deliver it to U.S. customers within 60 days of order.

The Norwood, Mass.-based subsidiary of Raytheon Co.

(Continued on Page 44)

FCC Proposes Resale and Sharing

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The Federal Communications Commission (FCC) has proposed resale and sharing of all international communication services — a move that could lead to reduced rates for many users.

To encourage this development, the FCC simultaneously granted International Relay, Inc., New York, authority to lease circuits for a cut-rate telex service between the U.S. and UK.

The service would consist of one-way, store-and-forward transmission from here to there. International Relay's proposed charge, exclusive of local access at either end of the message path, is 75 cent/min for point-to-point (single-address) telex messages and 70 cent/min for point-to-point (multiaddress) transmissions.

The cheapest international record carrier (IRC) rate, by comparison, is $1.39/min. Actually, the savings are even greater because International Relay plans to transmit overseas at 2,400 bit/sec, or possibly 9,600 bit/sec. Typical IRC transmission speed is 50 bit/sec.

A second application, covering a basically similar cut-rate international telex service, has been submitted to the FCC by Consortium Communications, Inc. (CCI), New York [CW, April 7]. The commission's proposal to allow resale and sharing combined with its grant of authority to International Relay indicates that the CCI petition will be approved.

USPS Offering

Another beneficiary of last week's FCC action may be the U.S. Postal Service (USPS), which wants to offer an international electronic mail service called Intelpost. So far, the Postal Service has been stymied by the existing rules that bar sharing and resale of international transmission facilities.

Specifically, the commission has ruled that two U.S. IRCs — TRT Telecommunications, Inc. and RCA Global Communications, Inc. — cannot resell circuits to the Postal Service unless they also offer to resell them to other customers.

Last week, the commission reaffirmed that position. But in view of the likelihood that the resale restrictions will ultimately be abolished, the carriers may de-

(Continued on Page 43)

Commercial Encryption Standards Slated

By Brad Schultz
CW Staff

ROSEVILLE, Minn. — Vendors of commercial encryption gear must adhere to a minimal set of standards before data communications users can cost-justify buying such products, according to Jim Nelson, who directs Univac's cryptosystems development while helping the American National Standards Institute (Ansi).

In August 1978, Ansi gave a group called X3/Sparc/Encrypt the job of planning commercial standards for data encryption. That was about a year after the National Bureau of Standards adopted an algorithm developed by IBM and sanctioned by the National Security Agency as the encryption hardware standard for civilian federal users.

The federal Data Encryption Standard (DES) subsequently became the basis of several commercial encryption product lines, despite the criticism of many cryptologists who charged that, under certain circumstances, the DES seemed vulnerable to computer-assisted attacks [CW, Nov. 26].

Standards Subgroup

Under Nelson's chairmanship, X3/Sparc/Encrypt recently created a subgroup, X3.T1, which will do the actual writing of standards.

According to Nelson, X3.T1 favors a methodology similar to that specified in proposed Federal Standard 1026, which would remove a few of the DES features that have aroused criticism.

Without standards, most vendors would find production of cryptosystems too expensive to be worthwhile, Nelson said in an

(Continued on Page 42)

Photo Courtesy of Siemens Corp.

Although Mary Queen of Scots (above) encrypted the letters by which she plotted to murder her cousin, England's Queen Elizabeth, those letters were decrypted by Elizabeth's agents in the nick of time. Convicted of treason, Mary was beheaded in 1587. Heads may also roll, so to speak, in contemporary organizations whose methods of securing sensitive data prove faulty.

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Multilink Costs 48 Cent/Min Less

TRT, Western Union Start International Telex

By Phil Hirsch
CW Washington Bureau

WASHINGTON D.C. — Multilink, a low-cost international telex service for users with high traffic requirements, is now operational. TRT Telecommunications Corp. and Western Union Telegraph Co. announced its availability last week, shortly after they received a green light from the Federal Communications Commission (FCC).

Multilink provides both real-time and store-and-forward international telex service. In addition, the same facilities can be used to transmit domestic telex and TWX messages. Multilink charges are 48 cent/min less than standard international telex rates for real-time service and 53 cent/min less for store-and-forward service. However, there is a minimum transmission charge of $8,000/mo.

The new service provides each user with two basic message paths. One is a 50 bit/sec dedicated circuit linking the user's terminal with TRT's overseas switching center in Fort Lauderdale, Fla. This connection supports the bi-directional real-time service. Outbound messages can be transmitted to as many as eight overseas locations.

The other path consists of one or more circuits connecting the user with Western Union's Infomaster switching center in Middletown, Va. These facilities, which may be dialed or dedicated, can operate at 50- to 4,800 bit/sec plus several intermediate speeds. They carry the customer's store-and-forward international telex traffic and also accommodate his domestic telex and TWX messages.

International telex messages routed to Middletown are sent immediately to TRT's Fort Lauderdale switching center and stored there until forwarded overseas. There is no extra charge for store-and-forward service, a TRT spokesman said.

He added that the customer can specify a "wide variety of arrangements" concerning the length of time messages are stored and how they are disposed of if on-line delivery is not possible within the designated time.

At the moment, however, store-and-forward service is available only for outbound Multilink messages. An inbound store-and-forward capability, for messages sent to the U.S. from abroad, is being developed. The spokesman indicated it will be available before the end of this year.

Faster Call Setup

Because real-time Multilink service is supported on dedicated circuits rather than on the domestic TWX and Telex network, it offers faster call setup time, TRT said. The company claimed the saving amounts to at least five seconds on a typical call.

Multilink originally was dubbed Express International Telex Service. It was designed mainly to compete with the unbundled international telex tariffs established by U.S. international record carriers (IRC) late last year [CW, Nov. 20].

Under those tariffs, the customer gets a choice. He can pay for the domestic circuit linking his terminal with an IRC switching center, or he can get a "free" access line from the carrier. If he provides his own access, the customer pays 55 cent/min less for use of the IRC's international telex circuit.

Some users, however, will cut their international telex costs considerably by using Multilink instead of a competing "customer-paid access" service, TRT said.

"If the user has a dedicated access line costing $350 to $400 a month," TRT Tarriff Chief Richard Yalen explained, "he must transmit 637 minutes of messages per month before a 55 cent/min rate reduction balances this expense.

"If he subscribes to Multilink, however, the crossover point is much lower. He gets the access line as part of the service package, and his only expense for this facility is a local access charge of $30 to $40 per month."

Interface Ties 3270s, RS-232C Equipment

ANN ARBOR, Mich. — IBM 3270 terminals can reportedly be linked to any RS-232C asynchronous, serial peripheral equipment with the Level II interface from Interface Systems, Inc.

Level II also allows remote access to a 3270 by means of conventional telephone lines, a spokesman said.

The interface costs $3,000 from Interface Systems at 462 Jackson Plaza, Ann Arbor, Mich. 48103.

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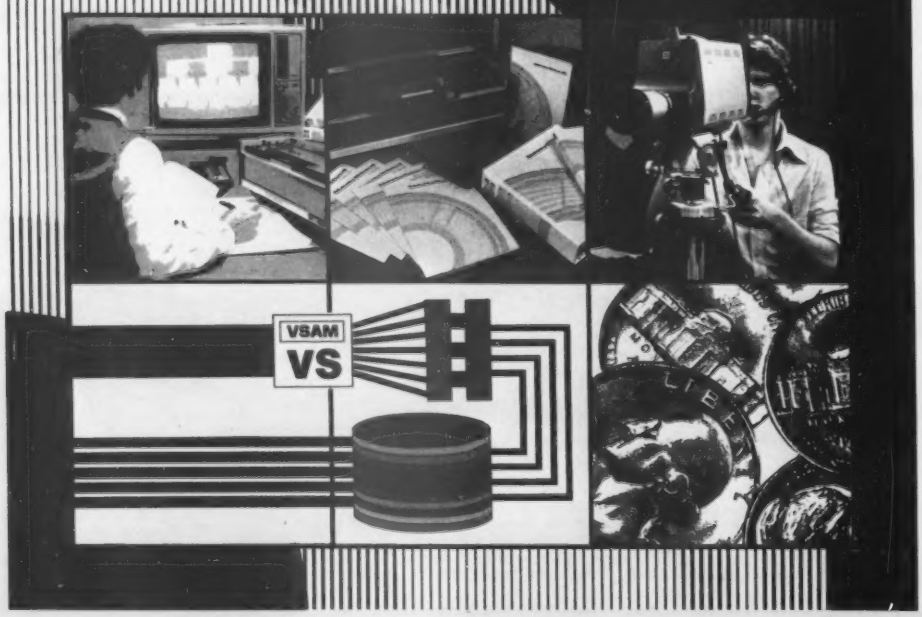

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Terminal Sends Ascii Messages to Facsimile

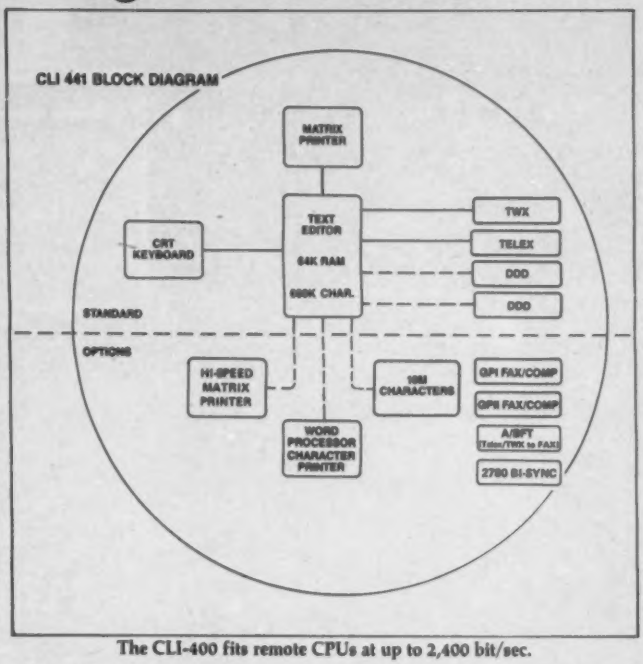
CUPERTINO, Calif. — Messages or text in Ascii code can be directly transmitted to a facsimile terminal using Compression Labs, Inc.'s (CLI) Model CLI-441 advanced communications terminal, according to the vendor.

That optional feature is reportedly similar to CLI's Ascii-to-facsimile translator, which is at the heart of Tymnet, Inc.'s Ontyme II and supports direct transmission of data from Ascii terminal to facsimile units [CW, March 24].

While messages are being prepared, the 64K-byte, 25-line CRT terminal can receive, transmit, translate and refile teletypewriter, Telex, direct dial or facsimile traffic as well as other formatted communications. Through a store-and-forward feature, the CLI-441 can pool facsimile inputs from remote facsimile units, translate between different types of facsimile equipment and route the traffic at the most economical time, CLI said.

The user can order up to four communications lines, and one of these may be taken up by either an optional facsimile compressor port or facsimile translation Group I or II (digital facsimile) port. Integral 300 bit/sec modems and an RS-232C interface are standard, but data access arrangements (DAA) and higher speed modems are available. Facsimile options require a synchronous 2,400 bit/sec modem to handle those transmissions, the vendor noted.

Dual 8-in. floppy disks are standard, providing 600K char. of text storage. A combination of fixed and removable disks increases storage capacity to 10M char. The mass text storage can be accessed by up to seven CLI-441 systems via a coaxial intersystem bus, the vendor said.



The CLI-400 fits remote CPUs at up to 2,400 bit/sec.

A 100 char./sec dot matrix printer is standard for use in communications applications, but a CLI spokesman said an optional 47 char./sec fully formed character printer allows the user to use a standard word processing package included with the CLI-441.

The base system with two communications lines, the matrix printer and 600K char. of floppy disk storage costs $10,900. Each additional line costs about $1,000.

CLI is at 10440 N. Tantau Ave., Cupertino, Calif. 95014.

Analyzer Gains Remote Control

SIMI VALLEY, Calif. — Users can now operate the TP-270 network analyzer from Teleprocessing Products, Inc. by remote control.

The remote controller option allows the TP-270 analyzer to accept commands for carrying out multiple line monitoring in both directions at the RS-232C interface based on the remote terminal address selected. A single TP-270 can be connected to each line to be monitored.

The TP-270 itself enables users to determine the effect of hardware and software changes on the network, measuring response time in an IBM 3270 terminal network and providing specific measurements of the elements contributing to response time, Teleprocessing Products said.

The basic cost of the TP-270 is $2,450, while the remote control option costs $395. A required printer interface card costs an additional $450, the vendor said from 4565 E. Industrial St., Building 7K, Simi Valley, Calif. 93063.

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FCC May Let Comsat Lease Circuits Directly

By a CW Staff Writer

WASHINGTON, D.C. — The Federal Communications Commission (FCC) has announced it may allow end users to lease Communications Satellite Corp.'s (Comsat) international circuits directly.

The commission also said that Comsat may offer other communications services, domestic as well as international, provided they are marketed through a separate subsidiary.

Under a policy adopted in 1966, telecommunications end users — with some exceptions — must deal with Comsat only through other carriers: U.S. international record carriers for data services and AT&T for voice services.

Allowing these users to deal directly with Comsat "would allow a major new influx of the benefits of competitive force into the industry," FCC Chairman Charles Ferris explained recently.

"Users would be able to pay a price based entirely on the advantages of satellite communications," he continued. "This also means that other carriers would compete knowing that if their prices for the same services were set too high, users could go directly to Comsat."

Separate Subsidiary

FCC Commissioner Joseph Fogarty, however, objected to the separate subsidiary requirement, as he has done in the past with regard to AT&T.

"I continue to object to the basic philosophy of the majority of the commission in the deregulation of common carriage — i.e., the imposition of onerous conditions and separate subsidiary requirements on dominant carriers in order to banish the specter or possibility of predatory practices by these carriers," he said.

"The commission fears that large carriers will suffocate competition unless they are denied the benefits of vertical integration. I believe that these restrictions ultimately will delay delivery of innovative international services to the U.S. rate payer, and when they do finally arrive they will cost us more."

A final decision on whether to let end users lease circuits directly from Comsat will not be reached for some time. Last week, the commission started the process by requesting comments from interested parties.

The commission has also asked for comments from interested parties on the question of restructuring Comsat. In addition, it sent a lengthy report to Congress specifying issues the legislators ought to consider before Comsat is unleashed and allowed to engage in new activities.

Congressional action is necessary to prevent Comsat from gaining an unfair advantage over prospective competitors, the report said.

For example, Comsat is the U.S. representative to the International Telecommunications Satellite Organization (Intelsat). The possibility of gaining an unfair advantage will arise, the commission said, "whenever the outcome of a matter before Intelsat . . . will have a direct or indirect financial effect on a non-Intelsat . . . activity of interest" to Comsat.

Ansi Plans Standards

(Continued from Page 37)

interview. They would have to start from scratch in finding ways to ensure high reliability and to minimize human involvement in the encryption process. Human involvement would increase the user's vulnerability to subterfuge, he explained.

Encryption Modes

Proposed Federal Standard 1026 defines two encryption modes — "cipher feed-back" and "cipher block-chaining" — that would remove an especially questionable feature of the DES known as the "electronic code book mode."

According to Nelson, the latter mode in the DES specifies that the same 56-bit encryption key will render a 64-bit block of unencrypted data (plaintext) into the same 64-bit block of encrypted data (ciphertext) after any number of applications.

That would inject tell-tale patterns into the encrypted bit stream, suggesting to the transmission eavesdropper the relationship between the plaintext and ciphertext.

Nelson recommends that plaintext never be enciphered through an electronic code book procedure, although that procedure may be appropriate for encryption of the key itself.

Six Levels

X3/Sparc/Encrypt found that users might apply encryption at six different levels in a transition between computer systems and terminals.

Data might be encrypted en route from the system's mass storage to the central processor, or en route from the processor to the sender's terminal, or at various points on the transmission link.

However, chaos would result if encryption and decryption are not performed at the same level in a cryptosystem, Nelson observed, since no plaintext would then be deciphered.

Such a prospect prompted the Ansi committee to propose three standards for data communications encryption. The first communications standard would specify how to encrypt at the level between the computer system or terminal and the line, Nelson said.

The second encryption standard would specify how to encrypt in the network — at a level high enough to ensure encryption throughout the network but without specifying encryption of tape media.

The third communications encryption standard would specify how to encrypt a system so that it might be used for both communications and traffic between mass storage and the central processor, Nelson said.

More on commercial encryption next week.

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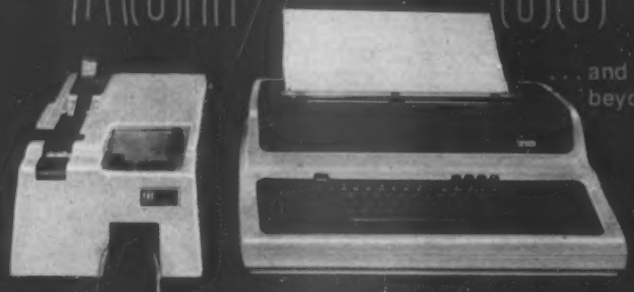

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FCC Proposes Resale, Sharing

(Continued from Page 37)

cide, on their own, to abolish them.

Last week's FCC action is only the first of a series of steps needed to do away with the international resale and sharing restrictions: the commission asked interested parties to comment on the idea. Approximately three months from now, the comments will be submitted, after which the FCC will adopt a final decision.

But in issuing a "notice of proposed rule making" last week, the commission made its own view clear. It stressed that "the burden of proof for establishing the justness and reasonableness of the [resale and sharing] restrictions is on those who seek their retention."

The commission also said that the "primary impact" of lifting the restrictions would be to reduce present price discrimination on users of different international communication services and increase "the number of firms and services from which telecommunications users may choose."

The proposal to allow unlimited resale and sharing of international communication service comes approximately four years after the commission lifted similar restrictions affecting domestic private line services.

"Resale" allows communication facilities leased from a carrier to be repackaged and resold by another commercial supplier; "sharing" involves joint use on a nonprofit basis — typically by multiple business firms which are otherwise unaffiliated.

But resale and sharing of switched public telephone services — MTS and Wats — is still prohibited. The latter restrictions are the subject of the commission's MTS/Wats inquiry (Docket 80-54), which may produce a substantive commission policy statement before the end of the year.

It seems likely, in view of last week's action, that the commission is now firmly committed to the idea of lifting all resale and sharing restrictions.

NBS Issues Encryption Key Plan

WASHINGTON, D.C. — A system for generating and controlling data encryption keys for decentralized DP networks has been published by the National Bureau of Standards (NBS).

"A Key Notarization System for Computer Networks" proposes a method for protecting on-line and off-line communications as well as non-shared files using hardware that implements encryption algorithms.

The key notarization system can also be used to protect against key substitution, to authenticate system users, to authenticate data and provide a digital signature capability, the report said.

The basis of the system is a key notarization facility which, when added to a DP system, allows users to manage keys as well as encrypt data. Notarization refers to the sealing of a key or password with the identities of the sender and receiver.

Key Hierarchy

The NBS report set out "a simple key hierarchy and set of commands or protocols which, in conjunction with a secure random key generator and a strong encryption algorithm, may be used to generate and store keys as well as to encrypt and decrypt data."

Key management is essential for an adequate encryption scheme, the report noted. "If the key management is weak, then the most secure cryptoalgorithm will be of little value. In fact, a very strong cryptoalgorithm used in a weak key management system can give a false sense of security."

The 29-page report, order no. SN003-003-02130-0, is available for $1.75 from the U.S. Government Printing Office, Washington, D.C. 20402.

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IBM 6670s Get SDLC Link

FRANKLIN LAKES, N.J. — IBM 6670 Information Distributor terminal users can now send and receive data directly from other 6670s using the Synchronous Data Link Control (SDLC) protocol.

The 6670 is the first IBM Systems Network Architecture (SNA) terminal to provide direct terminal-to-terminal communications over an SDLC link. As before, the 6670 can communicate with a host CPU using Bisynchronous or SDLC in an SNA environment.

Model 6670 operators can now use magnetic card media produced by IBM magnetic card typewriters and IBM Office System 6 information processors to send to other 6670s within the SNA network, IBM said from Parson's Pond Drive, Franklin Lakes, N.J. 07417.

Intelligent CRT Emulates 3278s

The IBM user would run Raytheon Data's PTS-2000 in small clusters, as shown above. But large clusters of up to 32 terminals per controller will be possible later this year.

(Continued from Page 37)

uses "the Intelligent Associate" as a nickname for the PTS-2000 and to underscore its long-term strategy for the programmable terminal.

According to the plan, Raytheon Data will follow IBM's lead in adding software and capabilities. As the industry giant extends its 3270 offerings, Raytheon Data will act likewise with the PTS-2000 series, striving always to add more for less cost to the user, the spokesman stated.

The Intelligent Associate will accompany the IBM customer as that organization sallies forth into decentralization and integration of DP and WP resources during the years ahead, the spokesman explained.

Integration-minded PTS-2000 users will soon gain support for Raytheon Data's Lexitron VT word processors, which recently received a range of communications capabilities [CW, April 7], the spokesman continued.

Terminal Memory

To run software that IBM users have had to run through controller units, the PTS-2000 contains 16K bytes of main memory and 8K bytes of read-only memory.

The terminal displays 80 columns of 10 by 14 dot matrix characters on a 15-in. screen. A PTS-2000 controller can drive a cluster of eight devices — combinations of PTS-2000 terminals and printers, the spokesman noted.

Keyboards in the PTS-2000 are microprogrammed and movable and come with either 75- or 87-key typewriter or data entry sets. The companion 132-col, bidirectional printer generates 7 by 9 dot matrix characters at 120 char./sec and accepts six-part forms.

A "typical" PTS-2000 configuration — four CRT terminals, a single controller and one printer — costs $22,170 or may be leased for two years at $529/mo, including maintenance.

Raytheon Data's Communications Department is located at 1415 Boston-Providence Tnpk., Norwood, Mass. 02062.

Multiplexer Also Gives Net Control

ANAHEIM Calif. — A statistical multiplexer that doubles as a network control device for up to 60 terminal circuits is available from Halcyon Communications, Inc.

As a statistical multiplexer, the Halcyon 4200 optimizes link use by up to 60 terminal circuits by allocating transmission time on a dynamic demand basis.

The terminals can operate either over a single voice-bandwidth link at speeds up to 19.2K bit/sec or on two independent links operating at up to 9,600 bit/sec each.

As a network control center, the 4200 gives the user the capability to remotely configure the network based on performance statistics and network diagnostics.

An average-optioned 4200 system with 20 channels costs about $410 per channel, Halcyon said from 212 Zanker Rd., San Jose, Calif. 95131.

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'Picture-Perfect' Configuration

Insurer's Data Entry Takes Giant Leap

By Tom Henkel
CW Staff

LOS ANGELES — When Farmers Insurance Group decided to beef up its data entry operation, it went about it in a big way. It installed two IBM 3033s, 13 Model 4331s, 42 Model 8100s and 883 IBM terminals.

The thought of stepping up from two IBM 370/158s at the home office and 13 360/30s at each of the firm's regional offices might throw many DPers into a deep depression. But seven months into the conversion, Farmers senior vice-president Louis Bohache said the firm has yet to experience a serious problem.

Farmers is delighted with a system that works, and IBM is beaming about a seemingly picture-perfect distributed configuration.

What happened to give this installation almost mystical perfection? Bohache said it was a little luck and a lot of planning.

Training Time

It all started about a year and a half ago when Farmers decided it was taking too long to train its data entry people, who were using a manual system at that time.

It took at least six to nine months to train its personnel. And when they were trained, they still made a lot of mistakes. Moreover, it took too long to process standard insurance policies — even with an allowance for mistakes, Bohache said.

Farmers wanted to cut training time to about five weeks. It wanted to eliminate mistakes as much as possible and it wanted to cut turnaround time to about 14 days.

Farmers decided the 8100 was the best system to achieve that goal. In something of an experiment, Bohache planned to replace the 360/30s with a string of 8100s. Employees would switch from the manual system to one using CRT terminals driven by an 8100 and tied into the two 3033s at the home office.

But before that plan could be implemented,

(Continued on Page 46)

Honeywell Makes Major Moves To Enhance Multics Offerings

WALTHAM, Mass. — Three major moves involving the Honeywell, Inc. Multics time-sharing system have been announced here:

- The DPS 8/70-M — a Multics version of the DPS 8/70 computer — will be available in the second quarter of 1981 at a purchase price of $1.3 million for the basic configuration.
- The price of the Level 68/DPS-M has been reduced from $1.2 million for a two-processor model to $640,310 for a similar configuration.
- A version of the Multics operating system known as MR 8 will be provided with the DPS 8/70-M and the Level 68/DPS-M. In addition to language enhancements, the MR 8 executive and its associated software sets will provide the facility for simulating the Honeywell Gcos III time-sharing environment.

The MR 8 basic executive only is available free to existing Honeywell users, although the current operating system will be available until July 1, 1981.

The DPS 8/70-M configuration includes a CPU with 1M byte of main memory, a System Control Unit (SCU) and one 35-slot I/O multiplexer (IOM).

The system can be expanded to a maximum of six CPUs, four SCUs and four IOMs, depending on the number of CPUs configured. The maximum combination of CPUs and IOMs cannot exceed eight.

Memory is expandable in 1M-, 2M-, 4M- and 8M-byte increments to 16M bytes, with one 16M-byte and one 32M-byte increment beyond that to the maximum 64M bytes.

Monthly rental for the DPS 8/70-M costs $39,400 on a five-year plan with a maintenance charge of $5,144/mo. Additional processors carry a purchase price of $981,450, a rental of $29,134/mo and a basic maintenance charge of $3,271/mo.

The 1M-byte Level 68/DPS-M basic central system consists of a CPU with 2K bytes of cache memory, one SCU and one IOM. Expansion capabilities are identical to the DPS 8/70-M. The system is available for immediate delivery, Honeywell said.

The Level 68/DPS-M rents for $19,800/mo with a monthly maintenance charge of $2,934. Additional CPUs cost $516,089; the rental is $15,810/mo plus the $2,211/mo maintenance charge.

Additional SCUs are priced at $57,788 on purchase and $1,435/mo on rental plus $105/mo for basic maintenance. The purchase price of the 35-channel IOM Is $175,055, the rental is $3,476/mo and the basic maintenance charge is $304.

Expansion from 35-channel to 54-channel function costs $53,855 on purchase or $1,152/mo on rental with a monthly maintenance charge of $103.

Add-on memory costs $50,000 per 1M byte on purchase and $1,140 on rental; basic monthly maintenance costs $60.

System Added to Cyber Line

MINNEAPOLIS — Control Data Corp. has added the Model 740 to its Cyber 700 series of large-scale mainframes.

The 740's main memory, which is built with 4K-byte static MOS chips, ranges from 1.31 million to 2.62 million characters. It is organized into eight logically independent, phased banks of 60-bit words allowing 10 6-bit characters to be stored in each word.

Extended memory in multiphased banks is available in sizes from 5 million to 20 million characters.

Features include an instruction stack to eliminate memory references on previously executed instructions and a CPU consisting of nine arithmetic functional units, each specialized for particular instruction types, which "increases efficiency over a unified CPU," the company claimed.

The 740 is field-upgradable to a 750 and 760 and is compatible with software and peripherals from previous CDC systems.

Prices for the 740 range from $1,492,500 for a system with 1.31 million characters of main memory, 10 peripheral devices and 12 I/O channels to $1,836,210 for a system with 2.62 million main memory characters, 20 peripheral units and 24 I/O channels. Monthly lease under a one-year contract begins at $36,315.

The 740 will be available for user benchmarking this month, CDC said from 8100 S. 34 St., Minneapolis, Minn. 55440.

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The Beall Channel Switch. Lets you switch critical on-line services to another CPU when failure occurs. Allows specific peripherals to serve more than one computer. Redrives all CPU signals to give you far more flexibility for physical placement of peripherals.

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Insurer's Data Entry Takes Giant Leap Forward

(Continued from Page 45)

IBM introduced its 4300 line. Since the 4331 is more powerful and better equipped to handle batch application programs from a 360/30, Bohache decided a 4331 would be a better investment.

Initial reports of the 4331's capabilities plus warnings from Farmers DPers that the idea of 8100s replacing a 360/30 might not work helped Bohache make his decision. He canceled some of the 8100 orders and asked for 4331s in their place.

Conversion Teamwork

Despite its being an IBM shop, Farmers had always been an independent-thinking organization. Its equipment was all from third-party vendors, and the firm never followed IBM's suggestions blindly.

However, in this case, Farmers and IBM made a good team. Farmers planned the conversion and IBM provided the technical help, Bohache said.

The job wasn't easy. All the DOS/-OS 360/30 programs had to be converted to run in a batch mode under the 4331's DOS/VSE operating system. "We were able to write some programs and conversion packages to convert 90% [of the programs] without having to get in and tear it down," Bohache said. Other programs required major rewrites and some had to be scrapped.

Preparing the software for conversion took about two months, he added.

In addition, Farmers decided its two 370/158s would not support the additional data that would be coming into the home office system once the distributed system got into full swing. For that reason, the firm decided to upgrade to two 3033s.

Installation Period

Then came the installations. Most of the 8100s and all 13 of the 4331s were slated for delivery inside of a four-month period, September to December 1979.

Since the 8100 is an install-it-yourself-type machine, Farmers felt those installations would be easy enough. However, since many of the Farmers employees who would be bringing them up had never even seen a CRT terminal before, Bohache decided not to take any chances.

DPers at the Los Angeles site took IBM's directions on how to install 8100s and rewrote them to eliminate any confusing choices. The result was a one-way installation that told regional employees how to install the 8100s according to home office specifications, he said.

The plan apparently worked. Of 38 Model 8100s installed in the first wave of sites, all but one came up without a problem. A defective disk drive turned out to be the culprit in that installation, Bohache said.

The 4331s were a different story. Although each regional office had its own DP staff to man the 360/30, Bohache decided it would be better for a two-man team from the home office to install each system.

The team systematically hit each regional office one by one and installed the machines on weekends. In all but one case, the 4331 CPU was running by Monday morning.

Using IBM's Installation Productivity Option/Extended (IPO/E), installation took an average of 20 hours per CPU. The actual system generation under IPO/E took an average of eight hours, Bohache said.

One 4331 is installed at each regional office. That CPU is located in the DP department in the space formerly occupied by a 360/30. Varying numbers of 8100 sytems are also installed at each of the 13 sites.

Four DBMS

When in full swing by the end of this year, the completed system is supposed to use four data base management sytems (DBMS), one for each insurance area offered: auto, home owners, life and commercial policies. All developed in-house, the DBMS will link the regional offices with the main 3033s. Currently the four DBMS all reside in the 3033s.

In the completed system, master files will be stored on the 3033s, and each regional office will have access to information processed at other regional offices, but they will also be able to operate independently from the other 12 regional offices, Bohache said.

Now in its last lap, there is still work to be done. Farmers is switching from 3277 terminals to 3276/78s. That involves revamping 8100 terminal loops — the originals were designed by Bohache on weekends — to accommodate more electrical resistance.

In addition, the firm has decided it can make better use of its 8100s if it switches about 60% of them from the Distributed Processing Control Executive (DPCX) to Distributed Processing Programming Executive (DPPX) operating systems.

"We can [attach] more terminals under DPPX than we can under DPCX. In addition, we'll have more programming flexibility under DPPX," Bohache said.

Although luck may have played a significant part in Farmers Insurance Group's conversion success, Bohache said planning was the biggest asset. The Los Angeles DPers assumed everything would go wrong when it laid its conversion plans. Nothing went wrong, but the planning effort may have helped the DP team understand the conversion process more thoroughly and therefore minimized the problems.

The new VISUAL 200 terminal has the features of competitive terminals and will code-for-code emulate them as well. A flick of a switch on the rear panel programs the VISUAL 200 for compatibility with a Hazeltine 1500, ADDS 520, Lear Siegler ADM-3A or DEC VT-52. This allows you to standardize on the new, reliable VISUAL 200 for virtually all of your TTY compatible video terminal applications, with no change in the software you've written for the older, less powerful terminals. And you're not limited to mere emulation; you can outperform them at the same time by taking advantage of the additional features and human engineering of the VISUAL 200, such as:

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- Smooth Scroll
- Tilt Screen (10° to 15°)
- Large 7 x 9 Dot Matrix Characters
- Others in the Feature Comparison Chart

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FEATURE COMPARISON CHART

FEATURE	Visual 200	Hazeltine 1500	Hazeltine 1420	Lear Siegler ADM-3A	Digital VT-52	ADDS 520	ADDS Regent 20	ADDS Regent 40
24 x 80 Screen Format	STD	STD	STD	STD	STD	STD	STD	STD
7 x 9 Dot Matrix	STD	STD	NO	NO	NO	NO	NO	NO
Background/Foreground	STD	STD	STD	NO	NO	NO	NO	STD
Insert/Delete Line	STD	STD	NO	NO	NO	NO	NO	STD
Insert/Delete Character	STD	NO	NO	NO	NO	NO	NO	NO
Clear End Line/Field/Page	STD	STD	NO	NO	STD	NO	NO	NO
Blink	STD	NO	STD	NO	NO	NO	NO	STD
Security Mode	STD	NO	STD	NO	NO	NO	NO	STD
Columnar and Field Tab	STD	NO	STD	NO	NO	NO	NO	STD
Line Drawing	STD	NO	NO	NO	STD	NO	NO	STD
Upper/Lower Case	STD	STD	STD	OPT	STD	NO	STD	STD
Numeric Pad	STD	STD	STD	OPT	STD	NO	NO	STD
Composite Video	STD	NO	NO	NO	NO	STD	NO	NO
Current Loop	STD	STD	NO	OPT	OPT	STD	STD	STD
Serial Copy Port	STD	STD	OPT	STD	OPT	NO	STD	STD
Hold Screen	STD	NO	NO	NO	STD	NO	NO	NO
Detachable Keyboard	STD	NO	NO	NO	NO	NO	NO	NO
Solid State Keyboard	STD	NO	NO	NO	NO	NO	STD	STD
Typematic Keys	STD	STD	STD	NO	NO	NO	STD	STD
Cursor Addressing	STD	STD	STD	STD	STD	STD	STD	STD
Read Cursor Address	STD	STD	STD	NO	NO	NO	NO	STD
Cursor Control Keys	STD	NO	STD	NO	STD	NO	NO	STD
Secondary Channel	STD	NO	NO	STD	NO	STD	NO	NO
Self Test	STD	NO	STD	NO	NO	NO	NO	STD
Baud Rate to 19,200	STD	STD	NO	STD	NO	NO	NO	NO
Smooth Scroll	STD	NO	NO	NO	NO	NO	NO	NO
Microprocessor	STD	STD	STD	NO	STD	NO	STD	STD
Tilt Screen	STD	NO	NO	NO	NO	NO	NO	NO
Switchable Emulations	STD	NO	NO	NO	NO	NO	NO	NO

The new VISUAL 200 obsoletes competitive terminals without obsoleting the software.

VISUAL see for yourself

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Most inexpensive printers print across the page, using a low resolution 5 x 7 matrix to cram 80 small, closely spaced characters into a six- or seven-inch line. The result can be hard to read:

40 PRINT "HIT ANY KEY FOR NEW DEMO"

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Yet, for all this the 655 is small – it measures only 6" x 12" x 12.5" and weighs just 15 pounds.

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The 655 is quiet. It's a fixed head thermal printer with no moving wires, heads or print elements to bang on the paper. No impact noise.

The 655 is extremely reliable: the only moving parts are the platen and drive motor assembly.

The 655 is compatible with most CRT terminals with serial RS232C ASCII printer or auxiliary ports. It's the perfect mate for our own Bantam 550, especially in systems requiring the computer to control the CRT cursor.

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PERKIN-ELMER

Three Options Made Standard On Data Printer 3000 Series

MALDEN, Mass. — Three options formerly priced at $276 in OEM single-unit quantities have been made standard on the 3000 series of band printers from Data Printer Corp.

Since the features being added to the three-member 150- to 600 line/min series are not causing an increase in the printers' costs — which range from $4,740 to $6,470 in single OEM quantities — the company maintains that prices have effectively been reduced 4% to 6%.

Details of Options

The formerly optional features include a 6- or 8 line/in. selector, a form length control switch and a paper motion detector which stops all printing if a paper jam occurs.

The 6/8 line/in. selection is geared toward applications with high paper costs and the form length control allows a maximum of 16 different settings between 3 in. and 18 in.

Inaccurate planned costs as related to the volume of printers being produced and recognition of the fact that OEMs require these features as standard equipment were factors in the change, the firm said.

All three features are standard on Data Printer's recently announced 3001 series [CW, April 14].

Data Printer is headquartered at 99 Middlesex St., Malden, Mass. 02148.

Label Printer Has Range Of Type Size

HILLSIDE, Ill. — A label printing system that prints characters varying in size from .1 in. to 12.7 in. has been introduced by Wallace Business Forms, Inc.

The Wallace X4600 was designed to interface with a variety of computer systems, and six keystrokes are required to program each character, Wallace said.

The standard 9 by 7 dot matrix is on edge-punched paper up to a maximum of 16 in. wide. Ninety-six- and 160-char. upper and lower case Ascii character sets are featured in addition to a plot mode of 8 line/in. and double height and underline characters.

Line Printer, Too

The X4600 is rated at 300 line/min with 132 char./line and 10 char./in.

In addition to functioning as a label printing system, the unit can double as a line printer, according to the firm.

The cost for the system can vary from $7,500 to $22,000 depending on terminal selection and customization.

More information can be obtained from Wallace Business Forms, Inc. at 4600 W. Roosevelt Road, Hillside, Ill. 60162.

Micrographics Explored

SILVER SPRINGS, Md. — The National Micrographics Association (NMA) has produced a report entitled "Micrographics: Its Relation to Other Information Handling Technologies," which reviews the potential for interface between micrographics and various systems and peripherals.

Computer output microfilm, computer-assisted retrieval, optical character recognition/computer input microfilm, word processing, computer graphics, bubble memory and video transmission and display are among the technologies discussed in "nontechnical" terms. The final section surveys the future of micrographics.

Copies of the report cost $100 from NMA Publications Sales, 8719 Colesville Road, Silver Springs, Md. 20910.

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The PDS270 is a microprocessor based system utilizing high speed "loop" technology - the most advanced technology available today for interconnecting data terminals. The PDS270 is designed with diagnostic capability for ease of maintenance. In addition to the features listed above on the PDS270 screen, an integral response time monitor is provided. The PDS270 represents a significant step in the continued growth and evolution of the Paradyne product line.

PIXNET is the most innovative approach to data communication networking. PIXNET expands data communications networks in a modular fashion. All devices within the network appear to the host processor as locally attached, resulting in reduced processor overhead and increased efficiency. Installation of the network is simplified. Host polling, error detection and correction is eliminated, and throughput and response time are significantly improved.

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PIXNETs Remote Control Unit (RCU) provides the communications interface between Paradyne or IBM peripherals located at sites thousands of miles away from the host processor. Devices supported include Paradyne card readers, line printers, magnetic tapes, diskettes, CRT Keyboards, character printers, systems

How Do You Recruit for Tasmania?

Centralized DP Cures Aussie's Staffing Blues

SYDNEY, Australia — Vast distances between major cities and stiff competition for technical expertise among DP people "Down Under" led Australian Mutual Provident Society (AMP) to centralize its entire DP operation in Sydney.

AMP's most important line is life insurance, although it also provides commercial, marine and domestic insurance; loans and mortgages; and financial services in the short-term money market. Assets are approximately $463 million in U.S. dollars.

The company was having difficulties in filling technical vacancies in remote areas like Tasmania. By concentrating its expertise in Sydney, "it was easier to recruit and hold onto staff," a company spokesman said. AMP currently employs a staff of approximately 270 DPers.

In addition, the communications facilities between population centers are provided by government-owned utilities. These proved to be "adequate rather than advanced," he said.

Development of its current communications network (Ampnet) began in 1973. A Univac 1100 was utilized to set up on-line programs, the front-end transaction control system and the conversion tools required for data base records and batch applications.

Three years later, the firm upgraded to a Univac 1100/43 multiprocessor. Implementation of Ampnet began with the phasing out of the IBM 360/20 and 360/30 systems that had operated in AMP's seven branch offices.

In 1979, AMP replaced the 1100/43 with an 8M-byte SP 1100/82 that includes 32K bytes of cache memory. Forty-two Univac 8433 and 8450 disk drives and four Univac drums provide 8,500M bytes of mass storage.

Offices in New Zealand; in northern, southern and western Australia; and in Tasmania are linked to the 1100/82 by Digital Equipment Corp. PDP-11/40 concentrators. On-line inquiry and data capture capabilities are provided by 260 Control Data Corp. 716 terminals.

Insurance applications were the first to be introduced in the branch offices. The overall daily average ranges from 4,000 to 10,000 transactions processed per application system.

On-line versions of smaller applications — such as internal ledger accounting, investment accounting and payroll and personnel systems — are being brought up at all locations simultaneously, one application at a time.

Uptime and Backup

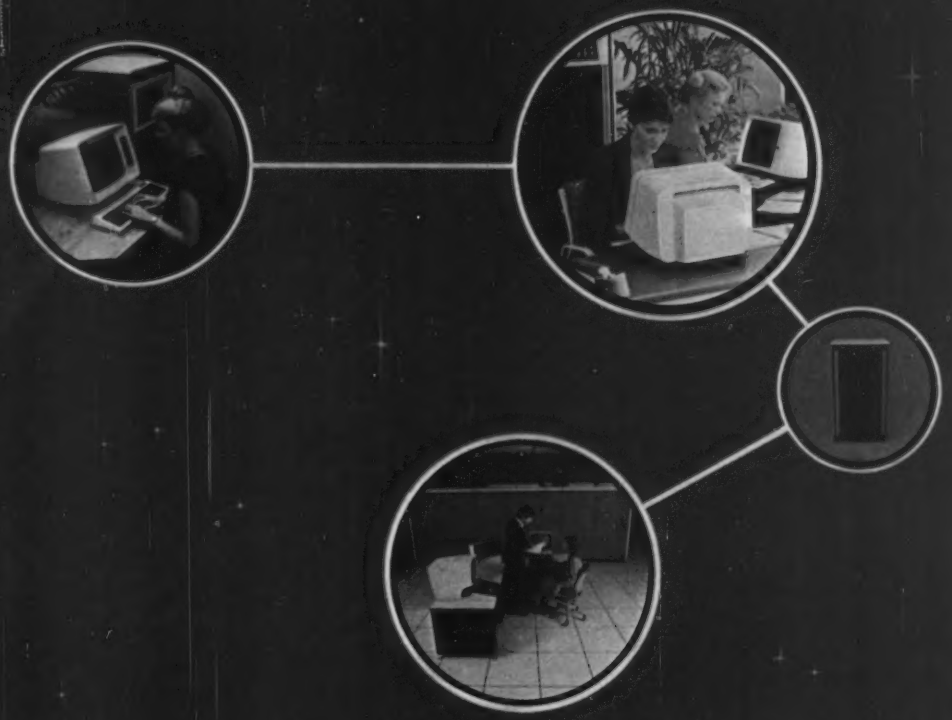
The network's hardware uptime is "99% or better," AMP claimed. "And, the average response time for immediate inquiries, once around 12 to 15 seconds or worse, is now down to 5 seconds or less."

Backup measures for the network include the concentrators — normally used for development at the company headquarters — that can emulate the functions of the regional equipment.

If telecommunications are disrupted, local transactions are recorded on tape and flown to Sydney for overnight batch processing. An independently operating configuration of SP 1100/82 that is used for development can also be switched to handle production work.

The company is presently in the process of commissioning a network diagnostic system from Computer Sciences of Australia for monitoring and fine-tuning Ampnet, he said.

from Paradyne



consoles and RESPONSE. All these devices appear to the host processor as locally attached IBM devices.

RESPONSE is Paradyne's distributed processing system designed to satisfy the requirement to process information at the remote site. It uses the PIXNET communications systems to provide interactive and bulk file transfers with the host processor. Therefore, complex IBM teleprocessing software is eliminated, making installation and maintenance of the communications system simple.

RESPONSE utilizes a powerful IBM 370 type architecture which includes ANSII 74 COBOL and an operating system, with transaction processing capabilities which are all familiar to the IBM user. Access to the system can be obtained from any location, therefore support groups are not required at remote sites. All this makes the transition to distributed processing practical.

If you'd like to learn more about how Paradyne will offer solutions to your networking problems, call or write:

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Redundant Mainframe-Based System

Reservation Facility Links 2,500-Hotel Chain

By Jay Woodruff
CW Staff

PHOENIX — Twenty-five hundred motels and hotels in the Best Western International chain were linked successfully Easter Sunday by a fully redundant mainframe-based reservation system.

The entire system was planned and built — including the construction of a facility to house it — in nine months under the direction of a 12-member planning group lead by the designer of the Holiday Inn's reservation system.

The reservations facility has at its heart a pair of IBM 370/148s that will see duty until the fall, when a pair of 4M-byte IBM 4341 mainframes will take over. The CPUs are backed by 18 on-line and 18 off-line IBM 3350 disk drives.

If an on-line disk fails, an off-line disk with the same information will take its place automatically while yet another off-line disk is brought up as a backup to the replacement, according to Ray Franks, the designer of the large system.

Reservation personnel here work on 350 Raytheon Data Systems Co. Model 1018 CRT terminals. Best Western hoteliers in the U.S. and 18 countries are connected to reservation personnel over phone lines by Texas Instruments, Inc. TI-990 based terminals for now, although other terminals are being sought that are thought to be more applicable for the job, Franks said.

Focal Point

The focal point of the system is a wall-sized computer-driven "board" that charts reservations activities throughout the world for the staff here. Problems can be recognized quickly and addressed based on information from the board's visual display, according to a Best Western spokeswoman.

To make sure the facilities in Phoenix appear as advanced as the reservation system that resides here, Best Western called in a designer from Disneyworld. The interior is said to resemble what one might expect to find on a spacecraft, the spokeswoman indicated. The finishing touches are being put on the building for its public introduction three months from now.

Software for the new system was downloaded to the TI terminals over the previous reservation system — Ramada Inn's Micor time-sharing service subsidiary — during March. Franks and his crew initiated an automatic calling sequence at 3 a.m. Easter Sunday to all the terminals in the field. The terminals were programmed to automatically cease calling the service bureau and began communicating with the 370/148s in Phoenix.

The cutover went so smoothly that Franks could only say, "It is not too exciting when it goes well."

SNA Net

The entire system runs under IBM System Network Architecture (SNA). Synchronous terminals operating within the system are first routed through an IBM Series 1 CPU which handles all line polling and editing and emulates a node on the SNA network.

Another Series 1 will be installed in Toronto as the first step in breaking the reservation system into regions for more efficient transmission to the host systems. Eventually Series 1 CPUs will be placed across the U.S. and later throughout the world to convert synchronous transmissions to the protocol used in the network, Franks explained.

The network not only connects all of the Best Western lodgings, but it is also a part of all major airlines' reservations system, he said. Airline personnel and travel agents can gain access to information on lodgings and reserve rooms.

United Airlines System

The system is based on United Airlines' Airline Control Program Passenger Airline Reservation System (ACP/Pars) and was developed in five months by Franks and his team. They began by renting 15 rooms and a pair of IBM 3031 mainframes at nearby Hughes Airwest to generate the system while the reservations center was under construction.

ACP/Pars was chosen as the basis for the system because of its proven ability to handle the 300 message-a-second throughput rate expected by Best Western during peak periods, Franks explained.

Training was accomplished rapidly. Best Western prepared 300 operators to use the system here in training sessions of two shifts running seven days a week. But this rapid movement to complete the reservation system pervaded the whole effort to get the system under way, according to Franks.

"From my perspective, going from absolutely nothing — no land, no people, no building — to a working system in nine months involved a really aggressive schedule, but we were able to meet every deadline along the way."

Franks added that the nine-month gestation time was roughly half as much time as would normally be required for a system of this size, especially in view of the fact that it had to be planned and built from the ground up.

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If you're thinking there's a catch in the software, perish the thought. The CDC-9766 is completely software compatible with the RP06; but you'll need to change a couple of bytes in your operating system software if you want to use the extra 80 megabytes you've got on the new drive. That should take you all of a man-hour of work to do.

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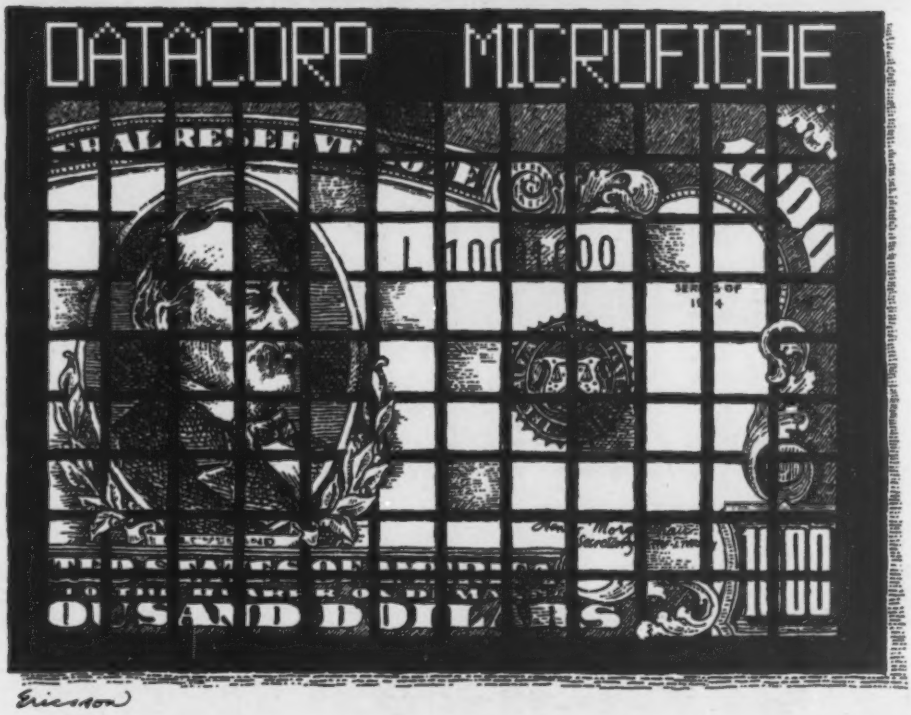

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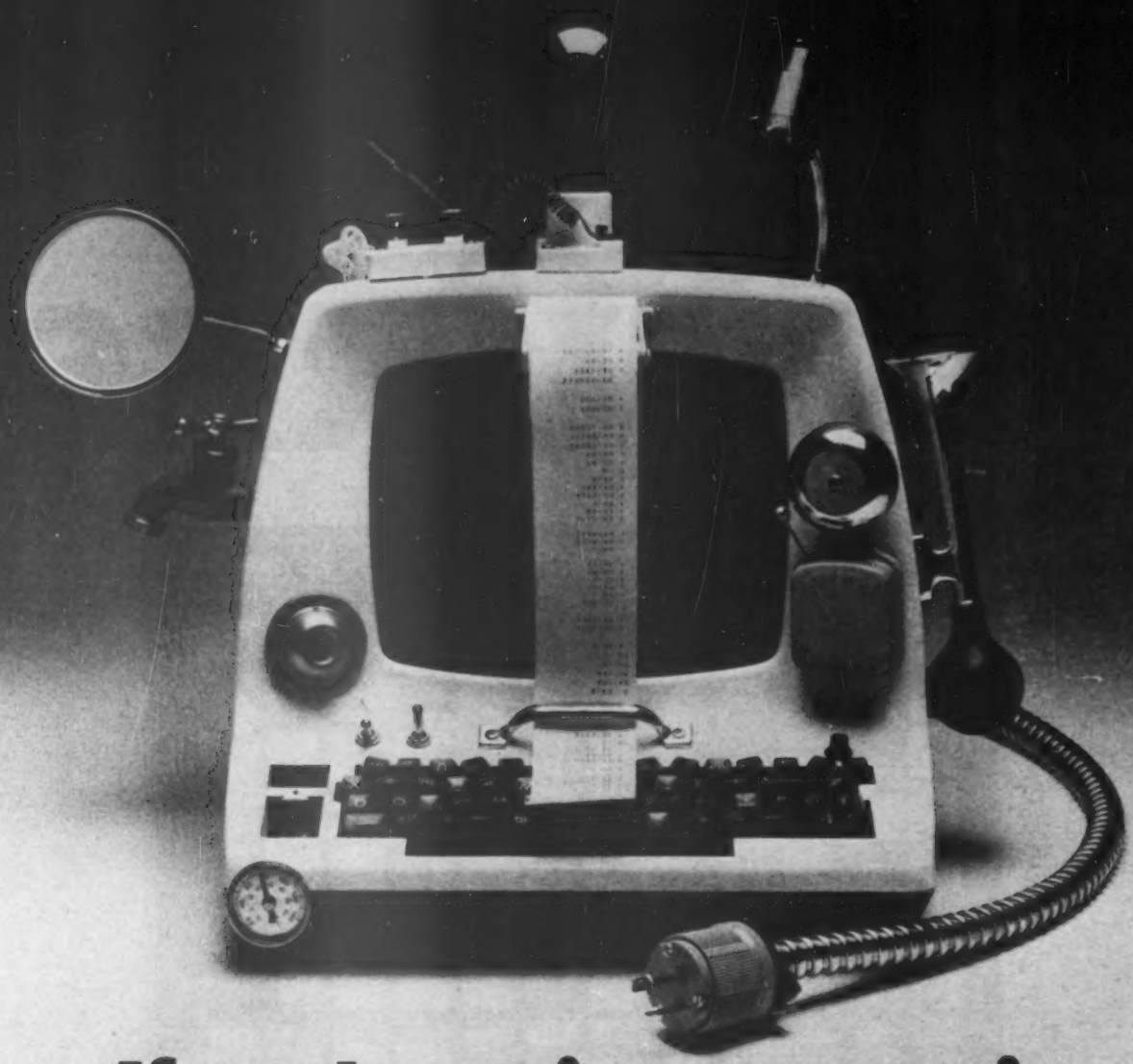

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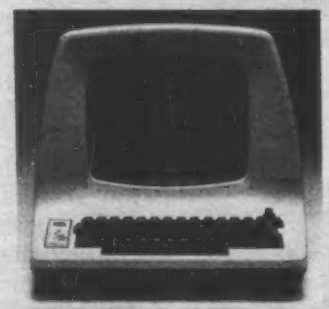

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Inside The IBM System/38

Architecture by G. G. Henry
Hardware Organization by R. L. Hoffman and F. G. Soltis
Machine Data Base Support by C. T. Watson and G. F. Aberle
Data Base Concepts by C. T. Watson, F. E. Benson and P. T. Taylor

Architecture

The IBM System/38 is a new general-purpose data processing system designed to provide a high level of function, ease of use, reliability, serviceability and nondisruptive growth. It supports advanced data base and interactive workstation applications as well as traditional batch applications.

These extensive capabilities are made possible by the use of novel architecture and design concepts, advanced technologies and new implementation of system components, both hardware and software. The new concepts include a layered structure providing consistent interfaces, a unique high-level machine architecture and powerful capabilities for virtual addressing and task management.

This section first summarizes the user support provided by the System/38 components and then introduces some of the salient architectural concepts that pervade the design of System/38.

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System/38 consists of a machine and three major IBM licensed programs: Control Program Facility (CPF), RPG-III and Interactive Data Base Utilities (IDU). The CPF provides operating system functions to other programming components and to the end user. RPG-III is an enhanced version of the well-established RPG-II language. IDU provides interactive data entry, source language entry and query functions.

These components fit together to provide a comprehensive and cohesive set of capabilities oriented to support advanced user requirements.

Figure 1 (on In Depth/3) shows a high-level view of the system, including the dependency of all programming upon the machine instruction set and the dependency of RPG-III and IDU upon CPF functions.

Some key characteristics of the user-oriented support are:

- Extensive data base facilities providing field-level described data, program independence from physical file structures through use of logical files and simultaneous access to data by multiple users.
- Flexible work management functions supporting several different application approaches and allowing dynamic sharing of storage and other system resources.
- High levels of device independence provided to programs — including screen formats and local/remote transparency.
- New control language and data definition interfaces providing consistent access to all control program and utility functions.
- Comprehensive and integrated authorization facilities.
- Powerful program development facilities such as library, test and debug, source maintenance and data base utility functions.

System-Oriented Design And Implementation

A total-system approach was used for the architecture, design and implementation of System/38. That is, systemwide design trade-offs were made during the design and implementation of *all* components of the system.

IN DEPTH

This approach toward eliminating potential problems of design mismatch was supported by imposing no *internal* compatibility constraints with previous systems. Furthermore, almost all design and implementation of hardware and programming was done in the same location by a single organizational entity.

This total system trade-off and design process has resulted in a high degree of fit between system components, thus eliminating redundancy and unused function.

Unified Function

The combination of the System/38 machine and the programming products provides a very high level of function, such as extensive data base facilities. Typically, these kinds of advanced functions have been provided on other systems by discrete "subsystems," each having different user interfaces, specific configuration restrictions, special resource tuning requirements and separate installation and

(Continued on In Depth/3)

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(Continued from In Depth/1)

service characteristics. Such a subsystem approach is partly the result of the lack of system-oriented design and implementation and the lack of well-defined architectural structures.

In System/38, the total-system design approach allows these advanced functions to be integrated into a single machine and a single control program with a single user interface to all functions on all system configurations. That is, *all* control program functions (other than I/O dependencies) are automatically available in all System/38 installations. Furthermore, no "system generation" or complicated tuning procedure is required to adapt the programming products to different machine configurations.

Figure 2 shows the System/38 integrated structure contrasted with a general subsystem structure.

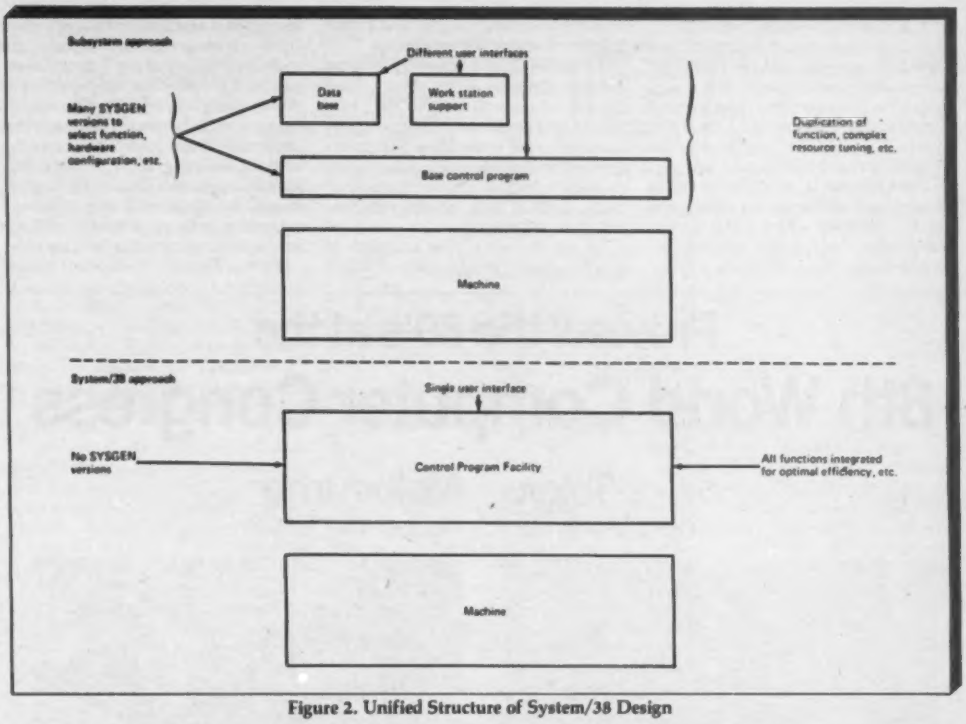

Figure 2. Unified Structure of System/38 Design

Layered System Structure

This approach to system-wide design and integrated function is supported by the layered structure of the systems. System/38 support is structured into horizontal layers, each providing a consistent interface that is not dependent upon implementation details of the other layers.

Most systems have a layered structure to some degree. The significant concepts of the System/38 approach are that there is only one interface for any general type of usage; this interface was designed such that all functions are presented in a consistent and extendable fashion, and the interface does not require or *permit* use of implementation details of the next lower level of system support.

The System/38 RPG-III and Interactive Data Base Utilities provide traditional high-level language and utility interfaces.

CPF executes on the System/38 instruction interface and provides three interfaces, each providing consistency and implementation-independent characteristics similar to those of high-level programming languages.

- A single new control language provides access to *all* end-user CPF execution functions through a consistent and extendable high-level interface. This is in contrast to having one specialized control language for the system operator, another for the workstation user, a third for the programmer, a fourth for the user of a system utility function and so forth.
- A single new data and file definition language supports both data base and device file definitions for all devices. This permits easy interchange of devices or device files with data base files without modifying programs or file definitions.
- The data management function interfaces used by both IBM and user programs provide high-level capabilities and consistency across all devices and data base functions.

High-Level Machine Architecture

Just as the program product interfaces are improved in structure and consistency over previous such interfaces, so is the machine instruction set interface. The primary characteristic of System/38 is its unique high-level machine interface. This provides many of the basic supervisory and resource management functions previously found in operating systems.

Examples of the System/38 advanced instruction set functions include physical record level data management, tasking management, queue management functions, generic and late-

(Continued on In Depth/4)

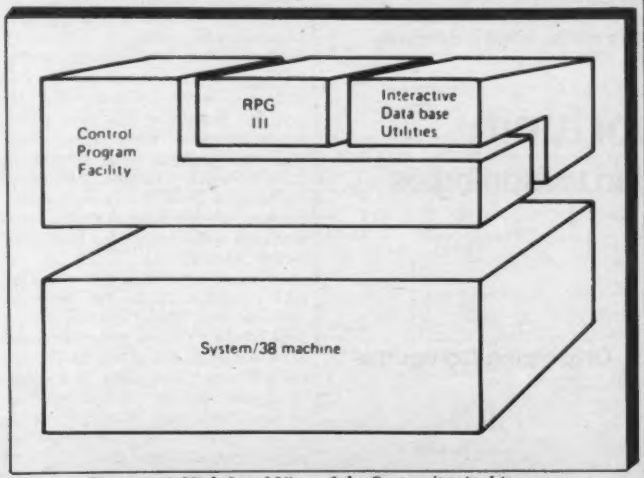

Figure 1. A High-Level View of the System/38 Architecture

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IN DEPTH

(Continued from In Depth/3)
bound computational functions and high-level program linkage functions. To provide these functions, it was necessary to employ new architectural concepts. For example, the instruction interface addressing structure is an "object-oriented, uniformly addressable store"; that is, all objects reside in storage and all storage on the system can be addressed with a single device-independent addressing mechanism. Furthermore, the addressing mechanism incorporates integrity and authorization checking for valid usage.

This generalized addressing scheme demonstrates one of the most critical general characteristics of the System/38 instruction set. Its structure is independent of underlying implementation characteristics such as hardware registers, physical I/O access mechanisms, detailed data formats and control block structures.

The significance of this approach is that it extends the advantage of high-level language interfaces to lower levels of programming: namely, the high-level nature of the System/38 instruction set provides the capability to make design and implementation changes to the hardware and functions implemented in microprogramming without affecting IBM or user programming. In addition, by placing advanced functions such as data base in microprogramming, a tight fit with the hardware structures can be achieved.

The concept of a layered system structure extends into the machine itself. There are three layers of support: the physical hardware and two layers of microprogramming. The boundaries between these layers represent internal design criteria and are not available for external use.

Figure 3 illustrates the total System/38 structure, including the internal machine divisions.

Several new hardware technologies are used in System/38. The combination of advanced capability provided by these technologies and the systemwide design approach result in new hardware structures and capabilities. For example, very powerful virtual addressing capabilities and task management support functions are provided by the hardware.

From a user viewpoint, System/38 offers a high level of function and ease of use. This is made possible by the use of advanced approaches in the underlying structure, design and implementation of the system components. The salient elements are:

- Use of new hardware technology.
- Application of systemwide architecture concepts across all system components.
- Implementation of advanced technical approaches.

Hardware Organization

The IBM System/38 hardware was designed to efficiently support its high-level machine architecture. An engineering design objective was to take advantage of new technologies such that certain high-level functions would be implemented in hardware and microcode. As a result, functions such as task dispatching, queue handling, virtual storage translation, stack manipulation and object sharing became a basic part of the hardware control structure. A further objective was to provide for sufficient extendability to permit future implementation tradeoffs.

Figure 4 shows the hardware configuration of the System/38. This article describes the hardware organization and the functions used by the hardware control structure.

The hardware consists of a processor communicating over a high-speed channel to independently functioning I/O units. The processor and the I/O units have access to a main storage array. The System/38 processor, which is implemented in a new, high-performance large-scale integration (LSI) technology, fetches 32-bit micro instructions from the random-access memory (RAM) control store shown in Figure 4 (8K words for both 5381 models 3 and 5).

One micro instruction is executed for each processor cycle. The processor cycle times are 400 or 500 nsec for the 5381 Model 3 (200 or 300 nsec for the 5381 Model 5), depending on the micro instruction operation. In a single cycle, either one- or two-byte arithmetic operations may be performed on signed binary, unsigned binary or packed format decimal data.

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semiconductor field effect transistor (Mosfet) technology main storage is available at two performance levels: 1,100 nsec fetch cycle time for the 5381 Model 3 and 600 nsec fetch cycle for the 5381 Model 5. Data path width is four bytes to either memory.

Available memory capacities are 512K, 768K, 1,024K, 1,280K and 1,536K for either Model 3 or 5. In addition, the Model 5 may have memory capacities of 1,792K and 2,048K bytes.

Direct memory access for I/O units as well as for the processor is provided by the virtual address translation (VAT) hardware which converts 6-byte segmented virtual addresses to main storage addresses. Address translation tables in main storage and a translation lookaside buffer in hardware provide mapping from virtual to real main storage addresses. Virtual addresses are used in I/O operations, and page faults are allowed during data transmissions with low-speed devices.

Page faults are resolved by data transfer from secondary storage. Data is moved to main storage in 512-byte page units from disk storage via the channel.

Each I/O device is connected to a controller which is connected to the channel. Magnetic media controllers (MMC) are used for high data-rate devices such as disks, while microprogrammed I/O controllers (IOC) handle a multiplicity of lower data-rate devices.

Each system also includes a system control adapter (SCA) which shares an IOC with the keyboard display console. The SCA performs the system maintenance functions, including testing the hardware logic circuitry.

Control Structure

System/38 manipulates a unit of execution called the "task." All computer systems need to control execution, and, in multiprogrammed systems like System/38, switch between units of execution, i.e., tasks. Traditionally, an interrupt structure with a fixed number of interrupt levels or classes, built on the hardware, is transformed by a software supervisor into a multilevel, interrupt-driven system to bridge the gap between the actual hardware and the abstract concepts of multiprogramming. The System/38 replaces this interrupt structure with a single tasking mechanism which is used to control all processing.

A multilevel, queue-driven task control structure is implemented in microcode and hardware on the System/38. A task dispatcher implemented in microcode allocates processor resources to prioritized tasks. I/O and program processing tasks are integrated in a common dispatching structure, with their priorities adjusted for system balance. I/O processing takes place when system resources are available, not when an I/O interrupt occurs.

I/O and program processing requests are stacked in main storage on a linked list called the task dispatching queue (TDQ). The task dispatcher selects the highest priority request from the TDQ and gives it control of the processor. Instructions associated with this task, known as the active-task, are executed until control is passed to another task.

A set of system control operations (SEND and RECEIVE) are used to communicate between tasks and to pass control between tasks via the task dispatcher.

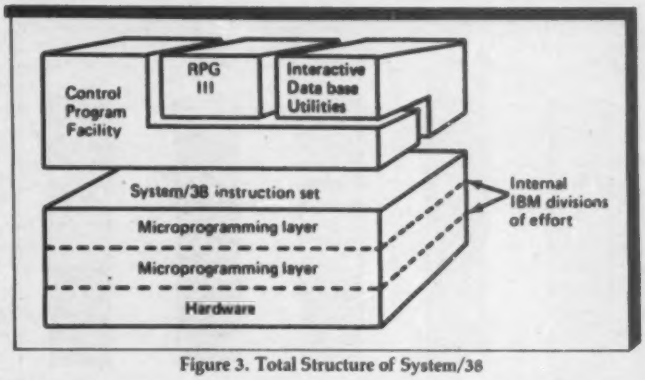

Figure 3. Total Structure of System/38

If the active task is to communicate with another task, it does so by sending a message to a queue in main storage known to both tasks. If the active task is to obtain a message from a queue, it executes a RECEIVE operation. If the message is available on the queue, the message is passed to the active task and processing continues. If the message is not available (for example, it has not yet been sent), the active task is made inactive and the task waits for the message. The task dispatcher is then invoked to select the new active task from the TDQ.

The task dispatcher is also invoked on a SEND operation if a task of higher priority than the active task is waiting for the message. If the waiting task is of lower priority than the active task, the task dispatcher is not invoked, but the processing request for the waiting task is placed on the TDQ.

I/O System/38 is implemented with a queue-driven command structure using the SEND/RECEIVE mechanism to pass information across the I/O interface. To a task, a device looks like another task. Commands to devices and responses from devices are exchanged in the same way that messages are communicated between any two tasks in the system.

The messages sent to the devices are specially formatted and contain the device commands. In addition to individual commands, a complete channel program can be sent as a single message.

Because a queue structure is used, command stacking is automatic. In a similar manner, the device sends response and status information back to a task via a main storage queue. Note that only commands and responses use the queuing structure; data transfers

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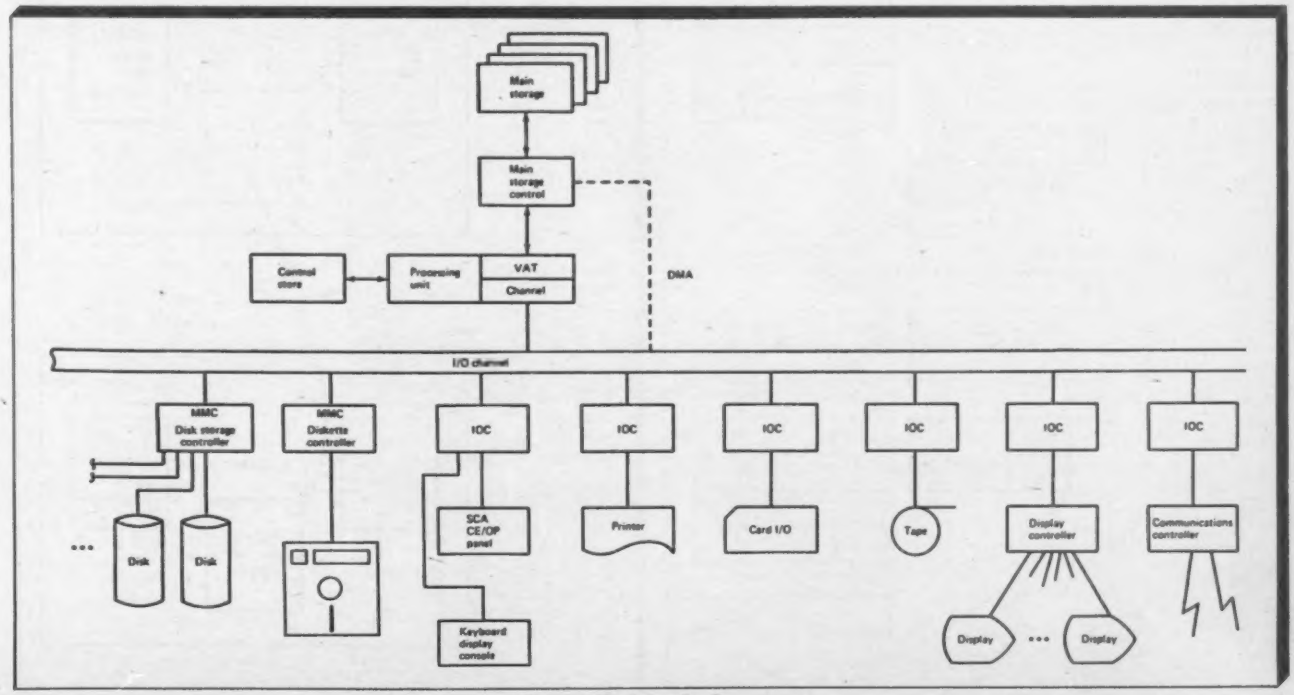


Figure 4. Hardware Configuration

IN DEPTH

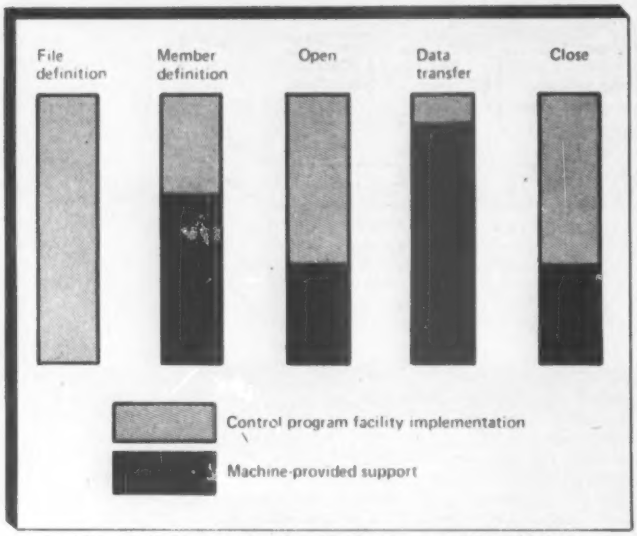


Figure 5. System/38 Data Base Facility Functional Distribution

(Continued from In Depth/5)

between devices and main storage are direct.

High-level call/return functions are directly supported by another set of system control operations which provide the linkage mechanism between routines executing within the same task. The performance of programs written using structured programming techniques is enhanced by the use of this mechanism.

The same linkage mechanism is used by the hardware to report program exceptions. With this mechanism, exceptions for any task (including such things as page faults) execute at the same priority level as the task itself. A low-priority task incurring an exception will not interfere with the execution of higher priority tasks.

Summary

The hardware implementation of System/38 provides the foundation on which the high-level machine architecture is built. Through the use of advanced LSI technologies, System/38 achieves a high level of processor performance and reliability. The use of intelligent controllers for I/O device attachments distributes the I/O workload throughout the system.

A unique aspect of the System/38 hardware and microcode is the incorporation of very powerful control functions. These functions provide a single mechanism which is used to control all processing in the system. Other high-level functions implemented in the microcode further enhance the flexibility and performance of the system.

Machine Data Base Support

One of the advanced features of System/38 is its data base facility. The data base facility is a primary component of the CPF, and much of the data base function is supported by the machine instruction set. This data base support is used by the CPF data base component, which adds ease-of-use characteristics.

The intent of this section is to describe this unique microcoded data base support and to discuss the factors considered in determining the level of support to be provided. A short description of the microcoded function is followed by a discussion of how performance, security, integrity and ease-of-use considerations affected the determination of the level of support to be provided by the machine.

Figure 5 shows the comparative level of function provided in the microcode support for the various divisions of data base function. In general, for the "data transfer" instructions of the CPF data base component, as much function as possible was placed in the machine to improve performance. For the other divisions identified in Figure 5, the distribution was dictated by function and the desire to have as little logic in microcode as possible.

In Figure 5, each column indicates the proportion of the function that is provided by the CPF code or by the machine-provided support. For "file definition," all the function is provided by CPF, while for "data transfer," the function is almost entirely provided by the machine support.

Microcoded Data Base Support

System/38 is an object-oriented machine and its machine-instruction interface is an object-oriented interface. The objects provided by the microcoded data base support are the data

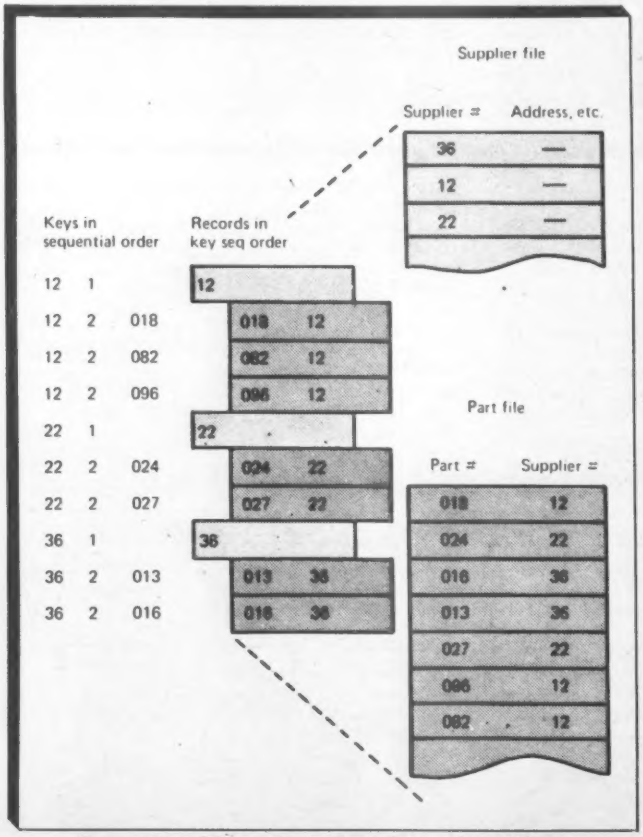


Figure 6. Use of Keys in Forcing Logical Hierarchical Ordering

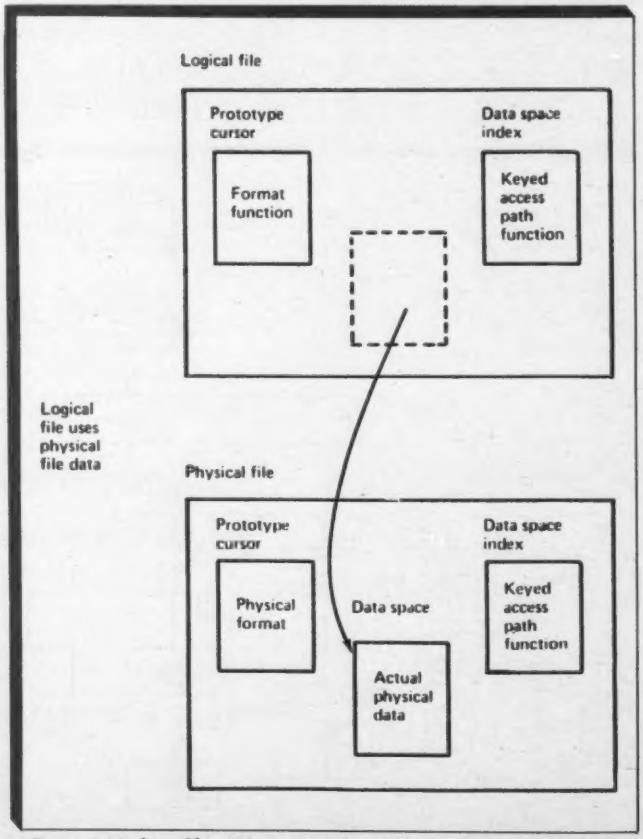


Figure 7. Machine Object Usage in Implementing Physical and Logical Files

IN DEPTH

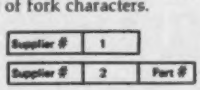
space, the data space index and the cursor.

The data space is the data storage object. It is an arrival sequence file containing records of a single format. The microcode supports record lengths up to 32K bytes and files up to 256M bytes.

The data space index is used to provide access paths other than arrival sequence. The data space index provides a logical reordering of the records in one or more data spaces, based on keys made up of field values in the records and constants called "fork characters." The data space index can provide a logical reordering of records in one data space, a logical merge of like format records from several data spaces, or a logical hierarchical ordering of records of different record types from different data spaces.

The key definition provides this extensive ordering capability. The key is made up of fields from the record, and fork characters, in any order. For each key field, ordering attributes can be specified, such as ascending, descending, absolute value, alternate collating sequence and so forth. The fork characters are one-character constants that provide very powerful ordering functions for duplicate keys or duplicate portions of keys.

Figure 6 shows the forced hierarchical ordering of duplicate supplier numbers in different record types through use of fork characters.



Assumed key definitions: where "1" and "2" are fork characters.

Figure 6 also shows how records from one or more files can be logically reordered through key definitions supplied with a data space index. The use of fork characters forces the record from the supplier's file to be returned before the records from the part file supplied by that supplier. Note that the part number field (or the supplier field) can be defined to be ordered in ascending, descending, absolute value or other sequence, independent of the fork characters.

By definition, a key exists for each record contained in each file covered by the data space index. A feature is provided to allow a subset of the available records to be addressed based on values in the record. This facility allows the records to be partitioned into logical files entirely differently than actually stored.

Through one set of data space indexes the data appears to be separated by days of the week, while through another set, the same data appears to be separated by sales department. The actual partitioning of the data may be done by either of these or by an entirely different method. The data space index is immediately updated to reflect changes in the data spaces it covers.

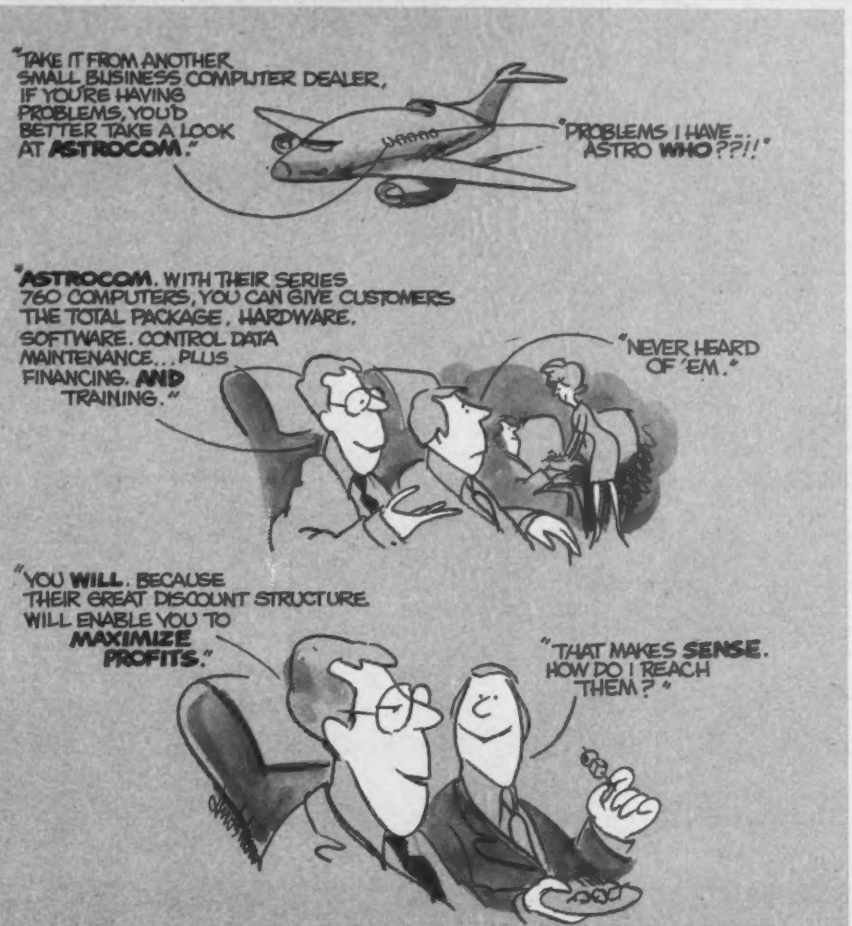
The data space index is implemented through use of a general machine index function that is also used by many other components and objects in System/38. It is based on a binary search algorithm and is optimized and balanced for performance among modification, random searches and sequential searches.

The cursor connects the data spaces and optionally a data space index to the process. It contains current position information for use in "next" type operations. If the data space index is not specified, the access path is either direct or sequential by arrival sequence over one or more data spaces where the data spaces appear to be concatenated. If the data space index is provided, the cursor provides a keyed access path for either random or sequential retrieval based on the key values or a direct access path via the arrival sequence relative record number. A very extensive set of search operations is supported.

The cursor is the facility through which records are locked between retrieval and modification. The cursor also contains the logic necessary to map the physical record to and from the logical record defined by the user. This mapping provides for reordering the fields, subsetting the fields and conversion of the fields to new types and lengths, thus supporting the logical file format capability.

As shown in Figure 7, physical and logical files are implemented through use of the three machine data base objects. The data space in the physical file contains the actual data. A data

(Continued on In Depth/10)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IN DEPTH

(Continued from In Depth/7)
space index is used where a keyed access path is specified.

A prototype cursor is duplicated for each shared usage of the file and contains the format function. The cursor, data space and data space index are used by the CPF data base component to implement logical and physical files.

Because System/38 is a data base machine and all of the user's file data is maintained by the data base facility, performance has been a very important consideration in the design. A very good way to improve performance is to move closer to the hardware.

In System/38, this was done by providing the data base search and modify operations in the machine. This can be seen in Figure 5 in the column called "data transfer." Machine instructions have been tailored to do, almost entirely, the work of the CPF GET, PUT, UPDATE and DELETE functions.

First, last, next, previous, generic next, generic previous and direct search functions are provided through a SET CURSOR instruction which supports the positioning portion of GET. The record, as defined in the logical format, is returned by a RETRIEVE instruction for the data portion of the GET. The UPDATE, DELETE and PUT functions are handled by UPDATE, DELETE and INSERT machine instructions which automatically update all the data space indexes to reflect the change.

The machine does all space management for the data base facility, utilizing the machine storage management component. The microcode has been thoroughly optimized to shorten "normal" path lengths and to reduce the number of pages touched, whenever possible.

A primary objective of System/38 is to improve security of the system, and the data base facility in particular, over previous systems. To effect this, object authorization was implemented in microcode below the lowest user-available interface. The objects are stored on auxiliary storage, but there is no interface available to the user for reading from, or writing to, this medium. All operations are made through well-defined, object-sensitive, microcode instruction interfaces which enforce object authorizations.

In systems implementing security and data base functions above a user-available interface, there have been ways to bypass the security of the data base. With System/38, the authorization and most data base functions are implemented below the lowest user-available interface, thus providing greatly improved security capabilities. It is for these reasons that measures like file keyword locks and data encryption are not considered to be necessary for the System/38 data base facility.

Integrity Attributes

The attributes of integrity are very similar to those for security. Because of a desire to improve data integrity in the data base facility, enough of the data base function was implemented in the machine to ensure that changes to objects must be made through the correct interfaces as defined by the architecture. In past data base systems, the user was able to bypass the data base support code and access the files through the file management interface, thus defeating integrity functions.

In System/38, all data base operations are done in move mode. The data base user never has access to, or the address of, the actual physical record. The most "physical" address that is available to a record is the object pointer and the arrival sequence number of the record in question. The only way this information can be used is through the appropriate data base support instructions.

In moving data in and out of the data base, some data checking is done under certain conditions, but for the most part, actual field data values are not checked. The data base facility does not explicitly do any range checking or guarantee any data-type validation. These are perceived to be user-defined requirements. On the other hand, usage of the centralized data definition capabilities will greatly reduce the chance of data-type errors.

Individual records are locked so that another process cannot change the record between the time a program reads it and the time the program is ready to write back the updated fields.

Because of the high level of data base

(Continued on In Depth/12)

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IN DEPTH

(Continued from In Depth/10)

support provided by the machine, many recovery-type integrity questions are solved. On process termination, files are automatically closed. Logical access paths will always represent the actual stored records or will be marked as unusable and needing rebuilding. Sequentiality of inserts is guaranteed. The facility to protect random updates and deletes is also provided.

Ease of use is one of the predominant design considerations of System/38 and the data base facility. Where not impacted by security, integrity or performance, the ease-of-use functions lie entirely above the machine interface. File definition is a good example.

The actual file definition, building of control blocks and system definition of data formats and field attributes are done entirely outside the machine-provided data base support. The file member definition has some machine support because of the creation of the data base objects involved. When the file is created, the format and access path definitions are stored with no machine data base support. When a file member is created, the machine data base support is used to create the data space, data space index and cursor that internally make up the physical and the logical files.

Summary

A unique feature of System/38 is its high level of machine function. In the data base facility, this is even more apparent than elsewhere.

Because of the efforts to provide good performance, the search and data transfer operations were implemented in the machine. Implementing security below the lowest user-available interface, and providing data integrity at that interface, resulted in objects being defined at the machine level and part of the OPEN and CLOSE functions to be implemented in the machine. The result is that, for the first time, optimum data base support has been provided at the machine instruction interface.

Data Base Concepts

The System/38 data base facility differs from existing data base packages in many basic ways. The preceding section explained that much of the System/38 data base function is supported by the machine and discussed the design decisions that were made regarding the level of function to be supported by the machine instruction set. The trade-offs covered in that section are performance, security, integrity and ease of use.

This section, on the other hand, describes some of the differences by giving an overview of the major functional characteristics. These characteristics include the System/38's design philosophy, its file structure, its sharing capabilities, its expandability and its data manipulation capabilities.

Design Philosophy

In past systems, full-function data base packages have been applications built on the machine's operating system and its file management component. This has always caused problems with security, integrity and performance. System/38 is the first computer system to have a full-function data base facility designed as a part of the basic machine. The data base capability is a primary function of CPF and is comparable to data base systems previously available only as applications on more expensive machines. All online data in System/38 is stored, manipulated and accessed through the data base component.

The extensive capabilities of the data base facility were designed to be avail-

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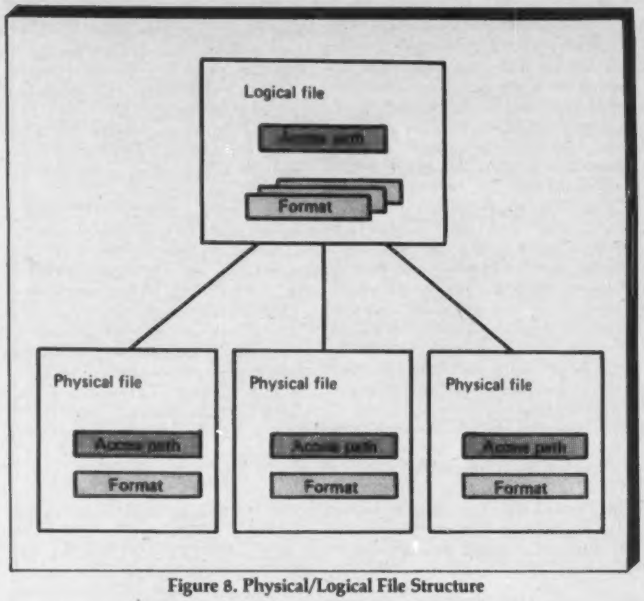

Figure 8. Physical/Logical File Structure

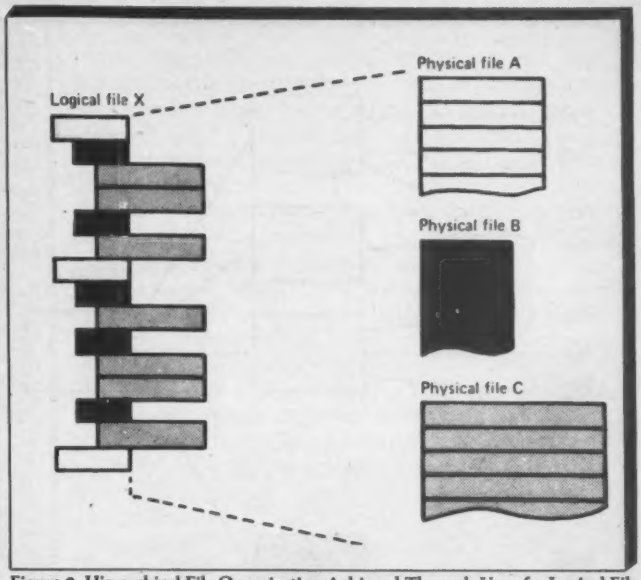

Figure 9. Hierarchical File Organization Achieved Through Use of a Logical File

able to the user at whatever level of function and sophistication is needed. The security, integrity and performance of the System/38 data base facility were enhanced by the consideration of the data base facility during the entire design of the system.

All on-line data in System/38 is stored as records in data base files. A data base file has three primary attributes: the *format* of records within that file, the *access path* for the records within that file and the *members* of that file. A record has a fixed format defining each field and its attributes. The access path for a file defines the ordering of records within that file and provides for either random or sequential accessing of those records. The members of a file are different instances of data sharing the same file definition (the same format and access path definition).

The access path defines an ordering of records either by arrival sequence (order of insertion) or by key sequence. The keyed access path provides comprehensive ordering functions. A key exists for every record addressed by the file. A key is made up of fields from the record and system-generated character constants used to achieve hierarchical or duplicate key ordering. Each field can have ordering attributes applied to it: ascending, descending, absolute value, an alternate collating sequence and so forth.

In addition, Lifo and Fifo duplicate-key ordering is specifiable for duplicate keys within a file.

A selection feature is provided to allow the access path to address a subset of the records within a file based on field values within the record. Keyed access path maintenance represents some additional overhead on data base changes and, therefore, continuous or deferred maintenance options are provided. To ensure that the access path always represents the actual existing data, the keyed access paths are automatically recovered in case of system failure.

The two types of data base files on System/38 are the physical and logical files, as shown in Figure 8. Physical files represent the actual stored data. Logical files provide alternate user views of the stored data to support application and data independence and to avoid redundancy of data.

As shown in Figure 8, a physical file has one access path and one format. A logical file is over one or more physical files and has one access path and one or more formats. Members of physical/logical files (not shown) are different instances of data sharing the same access path and format definitions.

A physical file has one format; therefore, all records within members of that physical file have the same fields, attributes and length. The records in each physical file member are ordered as defined in the access path for the file.

A logical file provides an alternate format and access path for one or more physical files. The logical file format allows a user to see a view of a physical record that subsets, reorders or changes the attributes of the fields of the physical record.

The logical file access path (1) allows the user to see a view of one or more physical file members and (2) subsets, or reorders, the records in those physical members. This provides the user with an alternate ordering of the records for sequential retrieval, or, for random retrieval, a different key than that defined in the physical file. A different key definition can be specified for each physical file member addressed and any field in the format may be used. Figure 9 shows how a logical file can be used to provide a hierarchical view of one or more phys-

(Continued on In Depth/14)

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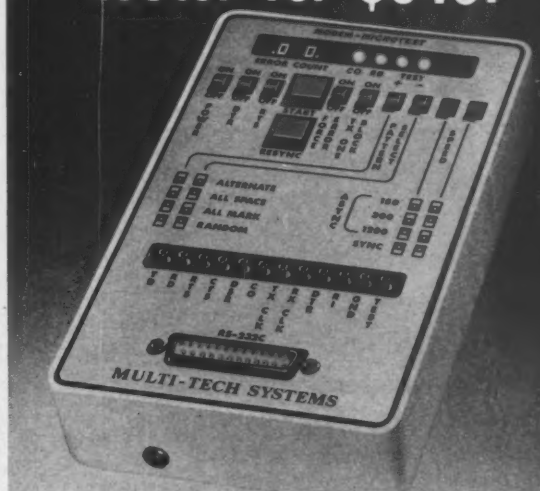

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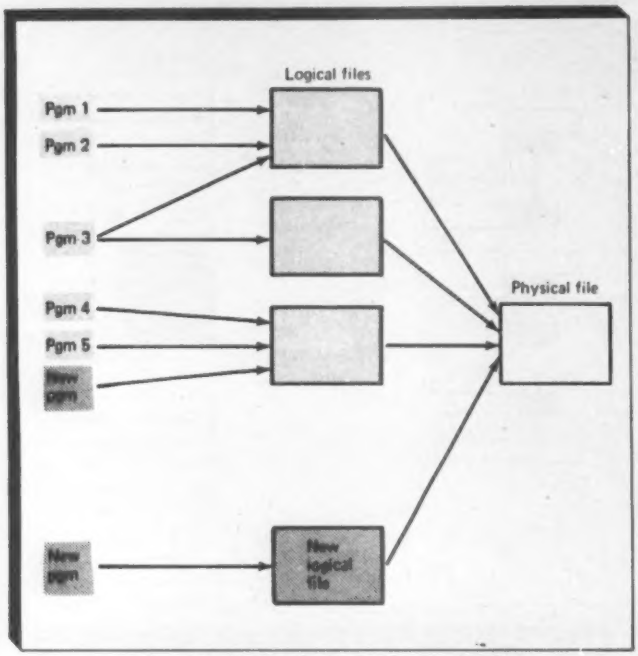

Figure 10. Meeting the Users' Changing Needs

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(Continued from In Depth/13)

ical files. Notice that the three physical files, through use of a logical file, appear to be in one hierarchical file containing multiple record types.

Another facet of this file-based design is security. Security in the data base facility is by file. When a user creates a file, he is the owner of that file and may specify public, private or normal authorization. "Public" implies all users have all authorizations on the object. "Private" implies only the owner can currently use the object. "Normal" indicates that only the system default authorizations should be made public. The user may subsequently grant any authorities to selected (or all) users and may transfer ownership to another user.

To create a logical file, a user must have the correct authority on each of the physical files referenced. To use a logical file, sufficient authorization must be available for both the logical file and its physical files. Field-level security is supported through use of logical files.

Data Sharing

Two of the main objectives in the System/38 data base facility design were to significantly increase shareability and decrease data redundancy. The main thrust of the physical/logical file structure is to achieve these ends. System/38 permits sharing on all levels. One of the major new features of System/38 is that file data definitions are specified to the system and shared. Programs may reference by name a central definition for file, format and filed authorities.

This means that the programmer supplies only the format name, and then the compiler automatically retrieves from the system the record definition for use in the compiled program. The programmer may choose to ignore the defined format and may redefine field names or even redefine the entire record format, as was the standard procedure in all previous systems. The use of centralized data definition allows improved programmer productivity, fewer errors, improved file maintenance and growth capabilities and provides the information needed for query, report generation operations and field-level prompting.

As noted previously, the execution-time sharing of System/38 data is very powerful. Different user programs through different logical files see the same data in diverse ways. To achieve this, the System/38 data base facility makes changes visible to all users immediately, prevents users from updating the same record concurrently and immediately reflects the change in all access paths.

Access paths themselves may also be shared. Another file type called a derived logical file allows different format definitions while sharing the access path with another file.

System Expandability

Through use of the physical/logical file structure and the system-defined data capability, System/38 has made the user's data base flexible enough to meet the changing needs of application programs and users. Following are several examples of this.

All file space expansion for additional record needs is handled automatically by the system unless the user specifies constraints.

New physical or logical files can be created at any time for use by new applications as shown in Figure 10. This has no effect on existing physical files, logical files or application programs.

Modification of the attributes of a data file will not cause the program to need to be recompiled unless the new definition is not consistent with the program's usage. The affected programs are automatically notified at their next usage to indicate their need to be recompiled.

Data Manipulation

The basic data base facility operations are OPEN, GET, PUT, UPDATE, DELETE, RELEASE and CLOSE. OPEN and CLOSE connect and disconnect the file and the process. GET locates and/or reads a record from a file and has very powerful search operations.

For arrival sequence access paths, the search can be sequential or direct. For a keyed access path, the search can be sequential, keyed or direct.

For sequential searches, the available options are first, last, next, previous and same. Next and previous imply the record (as defined by the access path) next to the currently addressed record. Same is used when the previous GET was for position only, and now the record is desired.

For direct searches, the options are to find the nth record in the arrival sequence or to find the record $\pm n$ records from the current position in the arrival sequence.

For keyed searches, GET can position to the record whose key is before, equal or before, equal, equal or after or after the position indicated by the key supplied by the user. Or, GET can position to the record whose key is next or previous to the position indicated by a leading portion of the key for the record currently addressed, that is, a generic next or a generic previous.

On every GET operation, the arrival-sequence position number of the physical record addressed is returned so that the user can later quickly reposition to any previously addressed record. This is very useful for "navigating" through a data base structure and can be used to jump from the hierarchical structure defined by one logical file to a different hierarchical structure defined by another logical file, that is, parent to child and back to a different parent.

PUT inserts a record into a file. UPDATE modifies the contents of a record. DELETE removes a record from a file. All three operations immediately update all the keyed access paths to reflect the change. RELEASE unlocks a record that was locked by GET for

(Continued on In Depth/16)

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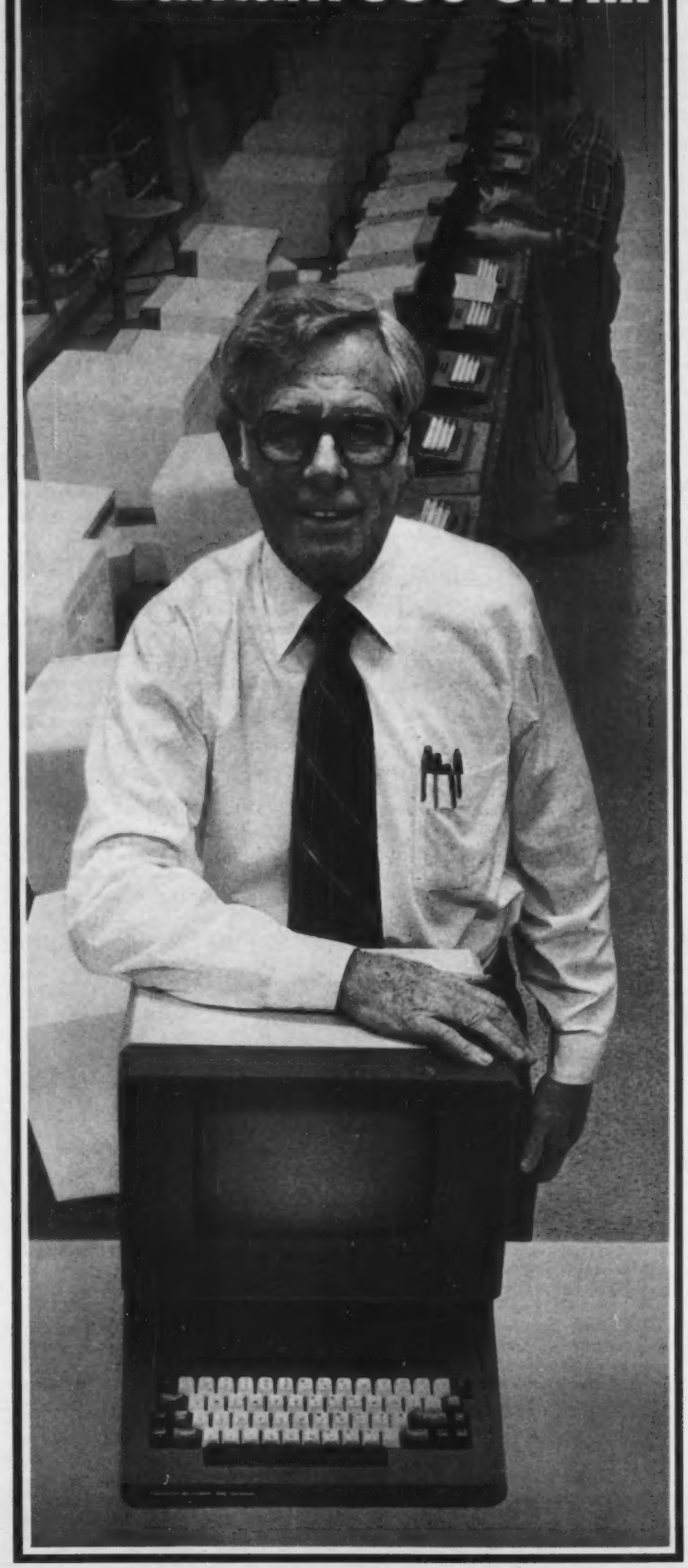

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IN DEPTH

(Continued from In Depth/14)
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The System/38 data base facility is unique because of its physical/logical file structure. It does not conform to the relational, hierarchical or network data base model, but combines aspects of each.

Physical File

A physical file is similar to a relational file. The requirements that relationships between records (key values) must be stored values in the record is similar to that in the relational model.

A logical file is a hierarchical file. The fact the multiple logical files can coexist and that the user can jump from one to the other provides function comparable with that provided by network models.

In combining these features of the classical models in this unique way, System/38 has given the user with an elegant, easy-to-understand data structure.

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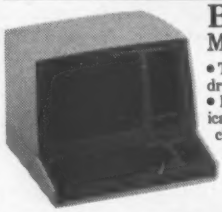

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Henry

Hoffman

Soltis

Watson

G.G. Henry is manager of System/38 programming development with IBM's General Systems Division (GSD), Rochester, Minn.

Henry joined IBM in 1967 and the GSD Advanced Systems Development Group in 1973. He was manager of programming development for the System/32 and held various technical and managerial assignments on System/3 1800 and other small system projects.

Henry holds an M.S. degree in mathematics from California State University, Hayward.

Roy L. Hoffman is an advisory engineer in a system organization and planning group at IBM's General Systems Division, Rochester, Minn.

Hoffman has held a variety of assignments since joining IBM in 1962, including acoustical analysis, mechanical diagnostics and pattern recognition. His current interests are in storage technology applications and system performance analysis.

Hoffman holds B.S. and M.S. degrees in electrical engineering from the South Dakota School of Mines and Technology and a Ph.D. in electrical engineering from the University of Denver.

Frank G. Soltis is with IBM's General Systems Division, Rochester, Minn.

Soltis joined IBM in 1963 at the Rochester Development Laboratory. Most recently he has been involved in the definition of computer system architectures, including the System/38 architecture. His current interests are in small system architecture designs and microprogramming techniques.

Soltis holds B.S. and M.S. degrees in electrical engineering from North Dakota State University and Ph.D. in electrical engineering from Iowa State University.

C.T. Watson is a staff programmer in the Advanced Systems Development Group of IBM's General Systems Division, Rochester, Minn.

He joined IBM in 1968 and since 1975 has been working in development of the System/38 data base facility.

Watson holds a B.S. degree in engineering mechanics from the University of Michigan and an M.S. in computer science from Washington State University.

Aberle

Benson

Taylor

Gary F. Aberle is an advisory programmer with IBM's General Systems Division, Rochester, Minn.

Aberle joined IBM in 1969 as a systems programmer working on the System/3 and System/32. He has been involved with the System/38 for the past seven years, working on machine data base support.

Aberle holds a B.S. degree in business administration from the University of Missouri.

Frank E. Benson is with IBM's General Systems Division, Rochester, Minn.

Benson joined IBM in 1966, working in compiler design and OS data management. In 1973 he joined the System/38 effort, working on the architectural development of System/38 data base.

Benson holds a B.S. degree in mathematics from the University of Minnesota.

Perry T. Taylor is a senior systems engineer with IBM's General Systems Division, St. Louis, Mo.

He previously worked as a systems engineer on Army Material Command account and a manager of system architecture for System/38.

Taylor holds a B.A. degree in mathematics from Southern Illinois University at Edwardsville.

Low-End, Mid-Range Additions

Modcomp Boosts Classic CPU Family

FORT LAUDERDALE, Fla. — Modular Computer Systems, Inc. (Modcomp) has boosted its Classic computer systems family by unveiling both a low-end stand-alone processor and a mid-range distributed network-oriented machine.

The first processor, the 7820, is positioned between the firm's smaller 7810 and the mid-range 7830 and 7835 models. Basically, the computer is geared to be a stand-alone processor or a satellite in a network for data acquisition and control or monitoring applications.

The 7820 includes 128K bytes of error-correcting memory, but is available in an upgraded version with 256K bytes. The machine is totally I/O- and program-compatible with Modcomp's Max III and Max IV operating systems and is the smallest of the company's systems able to use the latter operating system's virtual memory capabilities, a spokesman claimed.

The 7820 and its expanded memory cousin consist of a four-slot card file housing a single CPU-I/O processor module and a single-board memory circuit card. The remaining slots within the file permit user customization or expanding the basic system to meet future application needs.

Context Register

The computer series features a context register file containing 16 general-purpose banks, each one consisting of 15 registers that enable switching among several tasks without having to save and restore register content. The system also has four address mapping files, an expanded instruction set and direct-memory processing I/O channels, the spokesman noted.

The mid-range 7840 machine has 256K bytes of programmable error-correcting memory and is built to accommodate processing formats that range in length from a single-bit to 64 -bits.

The 7840 features an I/O connector panel which is used for peripheral interface. A programmer's maintenance panel allows the user to enter and display all memory locations, display general register or internal CPU register, initiate console interrupts and execute other maintenance functions.

The system uses the Modcomp II, Modcomp IV and Classic instruction set and can be used with the firm's Max II, III and IV multi-programming operating systems. Modcomp's Maxnet communications software can also be utilized by the 7840 for distributed network applications.

Memory Module

The computer's memory module array consists of two 128K-byte memory modules, combined on a single printer circuit board to form 256K bytes of two-way interleaved memory per card, the spokesman continued. The four-way interleaving can be configured with additional memory options.

The 7840 uses two logical memory access paths, providing concurrent CPU and I/O access capabilities. This feature allows the I/O processor to execute a previously called instruction or conduct a memory transfer while the CPU is accessing the memory, the spokesman pointed out.

The machine was also designed to handle multiple dynamic tasks, address fragmented memory in a contiguous manner and perform dynamic memory allocation.

The Classic 7820 with 128K bytes of memory is priced at $19,400, including the control panel and floating-point hardware. Its 256K-byte brother, the 7821, costs $24,400 with the same options. Finally, the 7840 with control panel and an 8-slot powered and cooled enclosure sells for $27,800.

First shipments of both machines are scheduled for the latter half of this year, the spokesman stated. Modcomp can be reached through P.O. Box 6099/1650, W. McNab Road, Fort Lauderdale, Fla. 33310.

Classics Get Memory Modules

FORT LAUDERDALE, Fla. — At the same time Modular Computer Systems, Inc. unwrapped two additional Classic processors, the firm announced a 256K-byte memory module geared for its 7830, 7835 and recently introduced 7840 CPUs.

The Model 3694 memory performs the function of main memory and is comprised of one printed circuit board split into two 64K-byte memory arrays. Each array includes programmable error detection and correction and on-board registers that are independently accessible, a spokesman said.

The memory modules can be programmed via the write memory status instruction to the following modes of operation: detection mode, correction mode and byte detect mode. Moreover, each pair is switch-selectable to one of four even/odd module pairs.

The 256K-byte memory option costs $13,000 and, like the two new systems, is scheduled to be delivered in the fourth quarter of this year.

Mini Works as Stand-Alone Or Links With 32 Peripherals

MANCHESTER, N.H. — A modular minicomputer system featuring a decentralized architecture that allows the computer to be used either as a stand-alone machine or be linked with up to 32 peripheral devices has been unveiled by Infotecs, Inc.

Infotecs' Control Center 2

The Control Center 2 can support up to 16 CRT workstations and handle up to eight system printers and 16 terminal-oriented printers. By adding additional floppy disk and cartridge disk drives, the system has a storage capacity of more than 800 million characters. In addition, the system gives the user communications capabilities via an RS-232C interface.

The basic Control Center 2 consists of a single CRT/keyboard terminal, a 150-char./sec impact printer and a control cabinet that houses a dual-drive floppy disk system. The basic configuration also contains two plug-in processor boards, with a provision for a third, and a power supply, a spokesman noted.

Five different option boards can be plugged into the computer's 32 available slots. Each board functions as a controller for a device or peripheral and each includes its own microprocessor with 32K bytes of memory. The boards include a CRT and printer controller, a floppy disk controller, a multiprinter controller and a general-purpose controller that can be used for communications, the spokesman said.

(Continued on Page 58)

CSSN Offers Bus-Oriented Line Of Small Business Systems

BOSTON — Computer Service Systems Network, Inc. (CSSN) has unveiled a microcomputer-based small business and research computer system that includes an 8-in. hard disk, a cartridge tape backup and the ability to be expanded from an 8-bit to a 16-bit processor.

The System 1000 is a modular, bus-oriented family of systems organized around the IEEE S-100 standard bus. The system has a 4MHz Z80A MPU, 64K bytes of random-access memory and a Winchester-technology rigid disk drive. The computer is available with several operating systems, as a stand-alone mainframe or a turnkey setup with printer and console, a spokesman said.

The heart of the S/1000 is the hard disk cartridge backup combination. The 24M-byte disk is interfaced through a controller said to be capable of handling up to four disk drives, via standard storage module device (SMD) logic. Disk-stored data is reportedly protected by a hardware/software backup system, featuring a 3M Corp.-type tape cartridge drive.

The backup file-oriented software is patterned after mainframe magnetic tape utilities and can store, file by file, as much as 13.4M bytes of data on a single cartridge, the spokesman explained.

Operating Systems

Operating systems for the S/1000 include Digital Research, Inc.'s CP/M 2.0 and CSSN's PDOS, a literal superset of CP/M 1.4 that takes advantage of the full Z80A extended instruction set as well as the qualities of the Winchester drives. Software that can be used with these operating systems include Basic, Pascal, Cobol, Fortran and C; business and financial application packages; data base management systems; and word processing programs.

In addition, the company plans to have by mid-1980 its system support Digital Research's MP/M, Phase One Systems' Oasis and a multiprocessor version of its PDOS.

The computer is priced from $15,000 to $20,000, depending on the configuration, from the firm at 120 Boylston St., Boston, Mass. 02116.

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Controller Takes Fixed and Floppy Drives

SUNNYVALE, Calif. — A microprocessor-based disk controller that incorporates an on-board data separator capable of handling up to four Winchester fixed or floppy drives in any combination has been unveiled by Shugart Associates, Inc.

The SA1400 is designed to work with Shugart SA1000 8-in. or SA4000 14-in. Winchester drives and SA800/850 8-in. floppy disk drives.

The device's design is based on a high-performance bit-slice microprocessor and has a number of firmware features that provide overlapped seek operations, integral data separators, automatic switching of head and cylinder and optional track formats, a spokesman said. Other features include automatic copy, sector interleaving, error correction codes that are autonomous to the host CPU and optional microdiagnostics.

Data transfer between the controller and the host CPU is reportedly enhanced by the SA1400's sector buffering abilities. Shugart's standard floppy disk protocol and either of the SA1000 or SA4000 fixed disk protocols are used for the interface to the drive. A general-purpose interface is said to be used to transfer commands and data between the host CPU and the controller, he added.

The controller costs about $1,060, depending on the user's disk configuration.

Shugart is located at 435 Oakmead Parkway, Sunnyvale, Calif. 94086.

Matchless Unveils Printer, Cabling for Micro Systems

GARDENA, Calif. — Matchless Systems, Inc. has introduced both a bidirectional dot matrix printer for Centronics Data Computer Corp. type microcomputer systems and a variety of cables for tape drives and peripheral devices.

The MS-204 printer is compatible with Radio Shack's TRS-80, Apple Computer, Inc.'s Apple and similar microcomputers. The machine has a 132-col, nine-by-seven dot matrix printing mechanism and is said to have a print head life of 100 million characters.

The printer has an operational speed of 125 char./sec and a throughput speed of 63 line/min. The unit's adjustable sprocket feed mechanism allows use of forms up to 9.5 in. wide, with loading from either the bottom or the rear. A full 96-char. Ascii set permits printing upper- and lowercase characters that can be expanded for double-width fonts in bold face.

The unit is priced at $795. Off-the-shelf cabling also offered by the firm includes two-drive and four-drive magnetic tape cables and cabling for the MS-204 printer. The two-drive tape cable costs $24.50, while the four-drive version sells for $34.50. The printer cable also costs $34.50.

Additional information on the printer and cables can be obtained from Matchless at 18444 Broadway, Gardena, Calif. 90248.

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Intel Unveils Enhancements To Series 90 Memory System

SANTA CLARA, Calif. — Intel Corp.'s Memory Systems Operations has announced a number of enhancements to its Series 90 memory system, consisting of a variety of modules that tailor the system's memory to the user's needs.

The enhancements, a series of dynamic and static memory modules, operate at 250 nsec and are said to be available in more than 1,500 different system configurations and capacities.

The 5V CM-90 memory module replaces the firm's original CM-900, which required three power supplies to function, an Intel spokesman stated. This series was built with the firm's 2118 16K-bit random-access memory (RAM). Modules built with these memories plug directly into CM-90 sockets and allow Series 90 users to quadruple system storage capacities without the need for other system modifications.

The second enhancement is a static memory module that stores up to 64K bytes and requires 50 percent less power than the two original series of static memory modules. These two previous memory modules have cycle times of 100 nsec and 140 nsec, as compared with the latest module's 250 nsec cycle time.

The static memory module was built with Intel's 2141 4K-bit static RAMs and offers direct upgrades to future modules using 16K-bit memories that the company plans to introduce at a future date.

Prices for the enhanced Series 90 memory systems are $15,875 for 256K bytes of 250 nsec static storage and $77,650 for 4M bytes of 350 nsec dynamic storage with error checking and correcting and error logging functions.

Intel Corp. is located at 3065 Bowers Ave., Santa Clara, Calif. 95051.

Disk Cartridge Fits DEC Drives

NASHUA, N.H. — A top-loading disk cartridge designed to be used with Digital Equipment Corp. RL01 drives has been introduced by Nashua Corp.

The 4443 cartridge offers 5.2M bytes of formatted data storage capacity. A servo technology intersperses controlling signals on the data surfaces so that both surfaces of the disk can be used for data recording and reading. The embedded servo signals position read-write heads and provide for increased data integrity, a spokesman claimed.

Each surface of the 4443's cartridge contains 256 tracks, with a density of 125 track/in. Recording density is 3,725 bit/in. and the device operates at speeds of 2,400 rev/min. The unit's recording disk is 14 in. in diameter, DEC-compatible and factory-formatted, the spokesman added.

Price information is available from Nashua at 44 Franklin St., Nashua, N.H. 03061.

Guide Gives Standard Model For Turnkey System Projects

VANCOUVER, B.C. — Augur Data Planning, Inc. has released a manual that details a standard model of a turnkey small business computer system.

Aimed at systems managers responsible for implementing turnkey computers, the model is broken apart into nine phases, each of which is subdivided into several specific tasks and activities. Each phase has specified client checkpoints to facilitate control of project cost and progress, a spokesman stated.

The book also has a number of graphics versions of the computer model that can be included in a manager's proposal or hung on the wall of a conference room, he added.

The manual costs $19.50 from the firm at 1401 W. Broadway, Vancouver, B.C. V6H 1H6, Canada.

Mini Runs as Stand-Alone Or Handles 32 Peripherals

(Continued from Page 53)

The system's terminal has a keyboard that separates from the screen unit and has a 97-key layout, with standard typewriter features and a numeric keypad for entering numbers. The CRT has a 12-in. viewing screen and can be tilted on its base.

The system's floppy disk drive utilizes two single-sided, double-density diskettes with a storage capacity of about 1M char. each, the spokesman continued. The cabinet was designed to accommodate a second disk drive, providing a total on-line storage capacity of about 4M char.

By adding a variety of cartridge disk units, the user can expand the system's storage capacity in 34M-, 68M- and 102M-char. leaps. A removable cartridge holds 17M char. in each of the three configurations and the remainder is fixed, the spokesman stated. Up to eight of these drives can be added.

Users can choose from between four printers. In addition to the 150 char./sec unit, there is a 340 char./sec dot matrix model, a 300 line/min band printer and a 55 char./sec letter-quality printer.

Finally, the system runs all of the software developed for earlier Infotecs computers such as general accounting, fuel oil, wholesale and retailing, job costs control and order entry.

The basic Control Center 2 is priced from $13,500 for a floppy disk-based system to more than $20,000 for a system with 34M bytes of hard disk storage — both minus software, Infotecs said from One Perimeter Road, Manchester, N.H. 03103.

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Lecht Calls Ban On Selling DP To Soviet Union A 'Stupid' Idea

By Jeffry Beeler
CW West Coast Bureau

MINNEAPOLIS — President Carter's recent decision to ban high-technology exports to the USSR will prove ineffective as an economic sanction because of the Soviets' high volume of domestic CPU production, according to Advanced Computer Techniques Corp. President Charles P. Lecht.

The Soviet Union each year ships more computer hardware than all U.S. mainframe manufacturers combined, except for IBM, Lecht said recently at the 10th annual NCR Corp. user-group convention here.

Thus, he explained, if the U.S. withholds crucial high-technology items from the Soviet Union, the Russians can either build the gear themselves or buy from other countries, especially France, whose star is rapidly rising in the international hardware manufacturing firmament.

Lecht labeled as "stupid," therefore, the contention that a high-technology trade embargo will hurt the Soviets and force them to curb their military and political ambitions in Afghanistan and elsewhere.

Exports of computer equipment to the Soviet Union, he said, should resume at once — but with one important restriction: "We shouldn't sell them our smallest computers, the energy-efficient ones with all the latest technology. Instead, we should sell them our big, inefficient computers with all the old technology.

"If we did that, we'd set their Backfire bomber program back 10 years."

'Brain Prosthesis'

In other remarks, Lecht predicted a "watershed" of computer-related technological innovations during the 1980s. The next few years, he said, should bring the advent of a microelectronic "brain prosthesis," tiny semiconductor chips that attach to the human brain and greatly magnify reasoning and memory capacity.

He also predicted the emergence of highly advanced microcomputers that literally perform hundreds of millions of instructions per second in an enclosure measuring only one cubic inch.

These and other technological breakthroughs, Lecht said, will greatly enhance the quality of human life, but they will also precipitate a titanic battle for market share among the computer industry's "supermanufacturers," including IBM, AT&T and Xerox Corp.

Despite the epic "turf fight" looming on the horizon, the computer industry will continue to grow and prosper — so much so that it will almost certainly prove large enough to accommodate all comers, large or small, Lecht said.

As the decade progresses, IBM's historical dominance of the computer business will begin to erode somewhat as the distribution of market shares gradually "evens out" among the various industry contenders, Lecht predicted. Cracks have already begun to appear in IBM's fortress, he added, and as the years pass the cracks will steadily widen.

IBM Keeps on Sunny Side At Shareholders Meeting

By Marcia Blumenthal
CW Staff

CHICAGO — Although he repeatedly stressed the negative impact of the swing toward leasing on IBM's 1979 financial performance, Chairman Frank T. Cary painted an optimistic picture of the future for the more than 2,000 shareholders attending the firm's annual meeting here last Monday.

Acting on that optimism, IBM's board of directors prior to the meeting voted a quarterly dividend of 86 cents per share payable June 10 to stockholders of record May 14.

Cary guided the two and a half hour meeting with aplomb and humor despite frequent interruptions from one agitated stockholder. He presented highlights from the past decade while IBM President John R. Opel touched on the challenges facing the firm in the 1980s, a fitting task since Opel will become chief executive when Cary retires in December.

Cary characterized the past decade as "litigious." Although he would not even hint at the terms IBM would consider reasonable to settle the U.S. vs. IBM antitrust case, he said the firm had made a good faith effort to settle the suit.

"The U.S. Justice Department never understood the dynamics of the computer industry," Cary declared. Since the trial started, some 200 companies have entered the industry, he noted.

Turning to the company's financial performance in 1979, which showed a modest revenue gain but a 3.2% decline in earnings

Frank T. Cary

from the previous year, Cary attributed most of the lackluster performance to the shift to leasing rather than purchase of equipment. As a result, IBM spent $4.2 billion for rental equipment last year. This represented about two-thirds of the total $6 billion IBM spent on capital expenditure.

"We have absolutely no objections to our customers leasing our equipment, but the

(Continued on Page 62)

Debut of CA's Protos System Scheduled for NCC — Again

By Marcia Blumenthal
CW Staff

IRVINE, Calif. — "A phantom product" was the way Gordon M. Watson described Computer Automation, Inc.'s Protos system introduced at the National Computer Conference in 1978.

But Protos is no longer in the shadows. The software development system will see the light in two weeks when it is introduced at this year's NCC, according to Watson, vice-president and general manager of CA's Naked Mini Division.

When the product was first announced, "we had underestimated the resources required to build an operating system, and we really did not have the iron to run the operating system."

The redevelopment of the system was delayed even further as financial problems beset CA last year. Those problems were brought on by expenses incurred in opening two manufacturing plants.

The firm also ran into high personnel turnover and engineering difficulties — it had trouble obtaining 16K random-access memories for Protos. Watson was brought onboard to resolve these difficulties.

First Bundled System

Until now the Naked Mini Division has primarily been an "iron house" selling CPUs to traditional OEMs. Besides being the firm's first bundled system, Protos will be heavily targeted to what will be a new market for CA — systems houses.

These vendors will most likely develop transaction processing applications on the system and sell the application along with the system itself to the end user, Watson said.

Comparing Protos to the multiuser development systems offered by major mini makers, Watson noted it will eventually support 16 on-line users doing editing and compiling. The initial release of the product, however, will support only eight applications programmers.

Applications can be developed using three languages: Fortran IV, assembler and Alamo, a proprietary language. When developed, the programs can be run on any Naked Mini system, Watson said. Unlike some development systems offered by other mini vendors, Protos does not feature a cross-compiler for popular microprocessors. How-

(Continued on Page 70)

U.S. Vendors Make Agreements Abroad

Two U.S. firms, Memorex Corp. and Xerox Corp., have signed technology agreements with corporations abroad.

Memorex, its subsidiary Memorex Mini Disc Drive Corp. and Fujitsu Ltd. have entered into a cross-license and technical exchange agreement on 8-in. rigid disk drives.

The pact calls for Fujitsu's immediate manufacture of the Memorex Model 101, an 11.7M-byte, 8-in. disk drive, and "continued Fujitsu technical support for future Memorex 8-in. products," Memorex said.

Xerox announced it signed an agreement with France's Thomson-CSF covering "joint development and know-how exchange between the two countries leading to production by both companies of an optical disk recorder for data processing purposes and office systems."

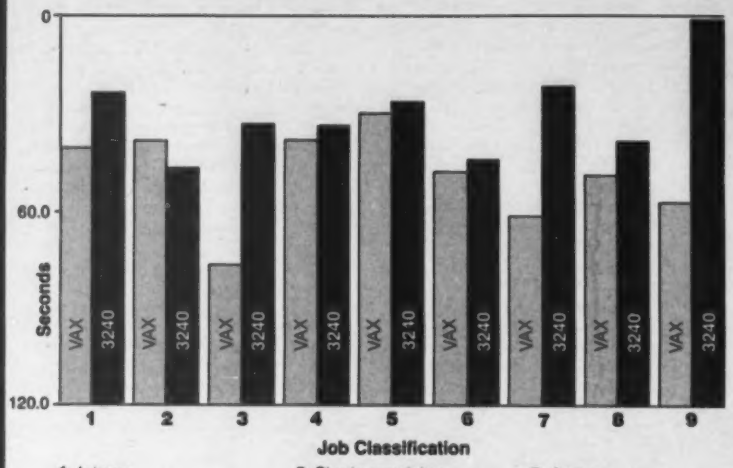
The benchmarks prove it...

1. Performance Measurements

Benchmark Name	VAX 11/780 CPU time	Perkin-Elmer 3240 CPU time	Performance Ratio*
PMS0154	1.140	0.907	1.26
PMS0254	4.710	4.485	1.05
PMS0354	9.160	8.990	1.02
PMS0454	43.610	43.451	1.00
PMS0554	86.420	86.123	1.00
PMS0664	1.610	1.350	1.19
PMS0764	7.040	6.679	1.05
PMS0864	13.730	13.370	1.03
PMS0964	66.830	66.068	1.01
PMS1064	132.920	129.727	1.02
PMS1124	1.520	1.306	1.16
PMS1234	2.470	2.424	1.02
PMS1324	1.310	1.618	0.81
PMS1407	251.560	37.327	6.74
PMS1507	50.260	57.657	0.87
PMS1674	22.440	23.005	0.98
PMS1724	52.550	53.133	0.99
PMS1807	50.180	34.766	1.44
PMS1907	32.020	34.679	0.92
PMS2007	17.720	20.264	0.87
PMS2107	13.450	20.242	0.66
PMS2202	33.311	26.352	1.26
PMS2324	121.610	137.997	0.88
PMS2402	0.940	0.539	1.74
PMS2502	0.720	0.562	1.28
PMS2624	122.920	227.689	0.54
PMS2708	4.850	0.961	5.05
PMS2809	103.770	0.006	17295.00
PMS2934	0.660	0.414	1.59
PMS3009	0.230	0.006	38.33
PMS3103	0.610	0.398	1.53
PMS3202	4.740	3.923	1.21
PMS3307	2.470	1.959	1.26
PMS3407	39.190	7.774	5.04
PMS3507	5.580	2.587	2.16
PMS3607	156.540	20.077	7.80
PMS3701	4.480	1.621	2.76
PMS3802	4.060	2.874	1.41
PMS3903	6.050	3.864	1.57
PMS4002	9.330	5.505	1.69
PMS4102	76.290	77.764	0.98
PMS4202	118.490	125.039	0.95
PMS4301	110.650	75.569	1.46
PMS4403	1.990	0.739	2.69
PMS4584	219.990	189.081	1.16
PMS4603	18.640	16.939	1.10
PMS4701	0.350	0.077	4.55
PMS4802	0.830	0.880	0.94
PMS4934	0.340	0.050	6.80
PMS5008	0.430	0.168	2.56
PMS5108	98.950	55.419	1.79
PMS5208	0.900	0.917	0.98
PMS5308	0.330	0.029	11.38
PMS5408	2.080	1.697	1.23
PMS5502	1.130	2.180	0.52
PMS5602	207.140	198.685	1.04
PMS5703	585.170	254.545	2.30
PMS5824	18.740	18.194	1.03

*Performance Ratio = $\frac{\text{VAX 11/780 CPU time}}{\text{Perkin-Elmer 3240 CPU time}}$

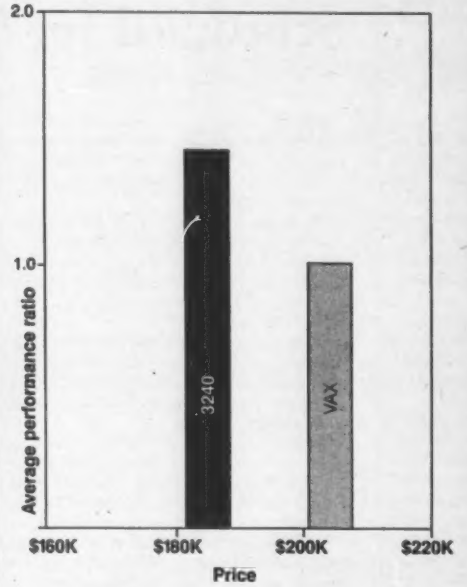
2. Perkin-Elmer 3240 vs. VAX* Average Time by Job Classification



1. Integer
2. Single-precision
3. Double-precision
4. Math functions
5. Single-precision whetstone timings
6. Double-precision whetstone timings
7. Arrays
8. Job mix
9. Compiler technology

*VAX is a trademark of Digital Equipment Corporation.

3. Proven Price/Performance



The configurations tested were 2 MB of memory, 67 MB disc, 75 ips tape, Floating Point Processor, CRT terminal, battery backup, and system software. The 3240 had a Writeable Control Store and Fortran Enhancement Package, while the VAX 11/780 had a Floating Point Accelerator.

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All 58 FORTRAN benchmarks listed in Table 1 were submitted by our customers and prospects reflecting their application needs. Applications that deal with the same kind of problems you face every day.

All benchmarks were run on-site at various locations across the country. And all were run by vendor-trained operators.

In Table 2, we organized the benchmark results into nine common types of job classification, so you can see at a glance how the 3240 stacks up vs. VAX 11/780. (The ninth classification demonstrates the superiority of Perkin-Elmer's system software, in this case globally optimizing FORTRAN VII.)

As shown in Table 3, the story is simple and uncomplicated. The Perkin-Elmer 3240 outperforms VAX 11/780. And it costs less.

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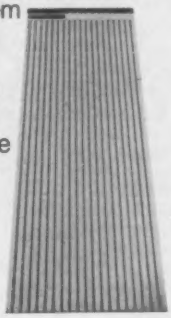
We'd be happy to send you a sub-set of those benchmarks which are non-proprietary or have been released with permission, so you can run them yourself. We'll also send you hardware and software documentation.



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Please send me ☐ complete information on the 3240
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IBM Honors Four With Fellows Appointments

NEW YORK — Four computer experts have been named IBM Fellows for their contributions to technologies ranging from advanced magnetics to signal identification.

IBM Fellows pursue scientific and technical research projects of their choice for five years. IBM started the awards in 1963; today 49 Fellows are working on projects.

In addition to the Fellows awards, 22 other IBM employees were granted awards totaling $545,000.

The new Fellows are Dr. Richard Blahut, Robert E. Pattison, George Radin and Dr. David A. Thompson.

Dr. Richard Blahut

Robert E. Pattison

George Radin

Dr. David A. Thompson

Blahut has contributed innovations in advanced direction finding, signal identification and secure transmission techniques. His signal processing methods make it possible to sort and isolate specific messages in areas where radio frequencies are cluttered with transmissions.

Pattison's award is for achievements in magnetic disk storage technology, including the first removable disk pack, low-cost disk actuators that have sped data access time and improvements in recording densities on magnetic disk surfaces.

Radin received his award for his major role in the development of PL/I, a programming language used widely in both scientific and business applications.

Thompson was instrumental in the design of a magnetic recording head that is the key component in IBM's newest family of magnetic storage products. His ideas for a sensing device to read magnetically encoded information led to the development of handheld scanners used in the company's consumer transaction and production control systems.

IBM Paints Optimistic Picture

(Continued from Page 59)

decision does have an effect on the timing of our revenue flows," Cary said.

In the short term, quarter-to-quarter results will continue sluggish if the trend toward leasing continues, Opel added.

According to Cary, the stock market has reacted to IBM's financial performance more severely than it should have. On the day of the meeting, IBM stock closed at $54.50 per share, down $25 from its price when the four-for-one stock split took place last May.

However, Cary rejected one stockholder's suggestion that the split was a mistake. The firm has added 120,000 new shareholders since last May, making it the third largest U.S. firm in terms of number of shareholders.

More Competition

As for IBM's future, Opel anticipates more competition. This competition will come from plug-compatible makers, AT&T and other U.S. and foreign telephone companies as well as semiconductor firms and companies like Exxon that will diversify.

"Competition will be from a "great number of well-managed businesses throughout the world," Opel said.

If Exxon is serious about diversification, it will be a formidable competitor, Cary added. IBM, he said, does not plan to diversify away from information processing.

Although he would not disclose future product plans, Cary noted IBM sees great potential in home computers and entertainment centers as well as Satellite Business Systems and medical instrumentation.

Besides discussion of financial results, a good portion of the meeting was spent on stockholder proposals related to trade with South Africa and communist nations.

A proposal to end trade with South Africa, which IBM opposed, carried only 3.4% of the shareholder votes — the highest vote of any shareholder proposal. "Each of you may have a different view on the spirit of compliance [with the government's trade embargo with South Africa], but our actions are to the letter of the embargo [provisions] and the intention which the government wanted to accomplish with the embargo," Cary said.

IBM elected its 21 board members without objection. However, one stockholder representing the Midwestern chapter of the Federation of Women Shareholders of America chided Cary for having only one woman on the board.

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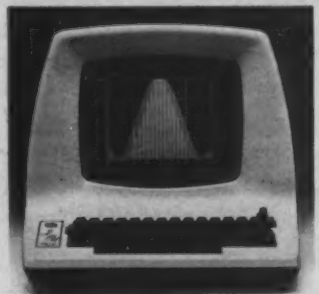

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Nestar to Aim Micro Sales at Business Users

By Jeffry Beeler
CW West Coast Bureau

PALO ALTO, Calif. — Before microcomputers can take the business world by storm, they must perform many of the same functions as today's large-scale CPUs.

With this philosophy in mind, Harry Saal, president of Nestar Systems, Inc., is setting up a sales network to integrate micros into the business DP function.

Creation of the sales network will give Nestar a new vehicle for marketing its Cluster/One Model A, a distributed networking product that allows as many as 65 of Apple Computer, Inc.'s Apple II microcomputers to operate independently while sharing a central disk file with up to 33M bytes of storage.

Nestar will also use the sales network to distribute its Cluster/One Model One, an older and less powerful version of the Cluster/One Model A.

Two Channels

When fully established, the sales network will allow Nestar, an 18-month-old micro vendor, to market its products through two main channels, according to Saal. One of the channels will consist of OEMs and systems house, the other, of computer equipment dealers and distributors.

The OEM and systems houses side of the network will give Nestar potential entree to customers in several hundred vertical marketplaces, including real estate, manufacturing, education, medicine, public accounting and product distribution. In practice, OEMs and systems houses will buy Nestar's hardware and then integrate it with their own proprietary application packages to form systems tailored to the buyers' respective market specialties.

On the other side of the network, Nestar will rely on a nationwide chain of independent Apple hardware dealers and distributors to sell its systems to banks, schools, hospitals, businesses and other commercial users. About 750 Apple dealers and distributors already exist throughout the U.S., and Nestar plans soon to begin signing sales agreements with as many of them as possible.

The company has expressed particular interest in the Apple distributorships operated by Bell & Howell Co., International Telephone & Telegraph Corp. and Xerox Corp., which in mid-April opened the first in a planned chain of office equipment retail stores.

To build its proposed marketing network, Nestar recently hired Donald Anderson as vice-president of sales. Anderson, who held marketing positions with Burroughs Corp. and served as president of a San Francisco-based computer retail store, comes to Nestar with industry experience in both mainframes and microcomputers.

Anderson's background is ideal for Nestar's view of the marketing of microcomputers. Many vendors and users alike, Saal explained, still regard microcomputers as little more than high-priced toys unsuitable for any application weightier than playing "Star Trek" or balancing a computer hobbyist's checkbook.

Main Attraction

One of the main attractions of using microcomputers for commercial applications is that the machines, in effect, allow computing power to be moved out of large central mainframes and placed instead in the hands of the people who need it.

So Saal and his associates have embarked on an effort to embed as many large-systems features as possible in their products and then sell the hardware to sites that in the past have been reserved exclusively for mainframes and minicomputers.

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Now choose from five models: IBM 370, NCR Century, System/3, "plain" (pictured above) . . . or the new "I HATE MY COMPUTER" which shows a frustrated DP'er strangling his system! Gold-finished, hefty plaster sculptures, perfect paperweight/conversation pieces. $9.95 each, postpaid. Brian Productions, 2949 Southfield Rd., Xenia, Ohio 45385

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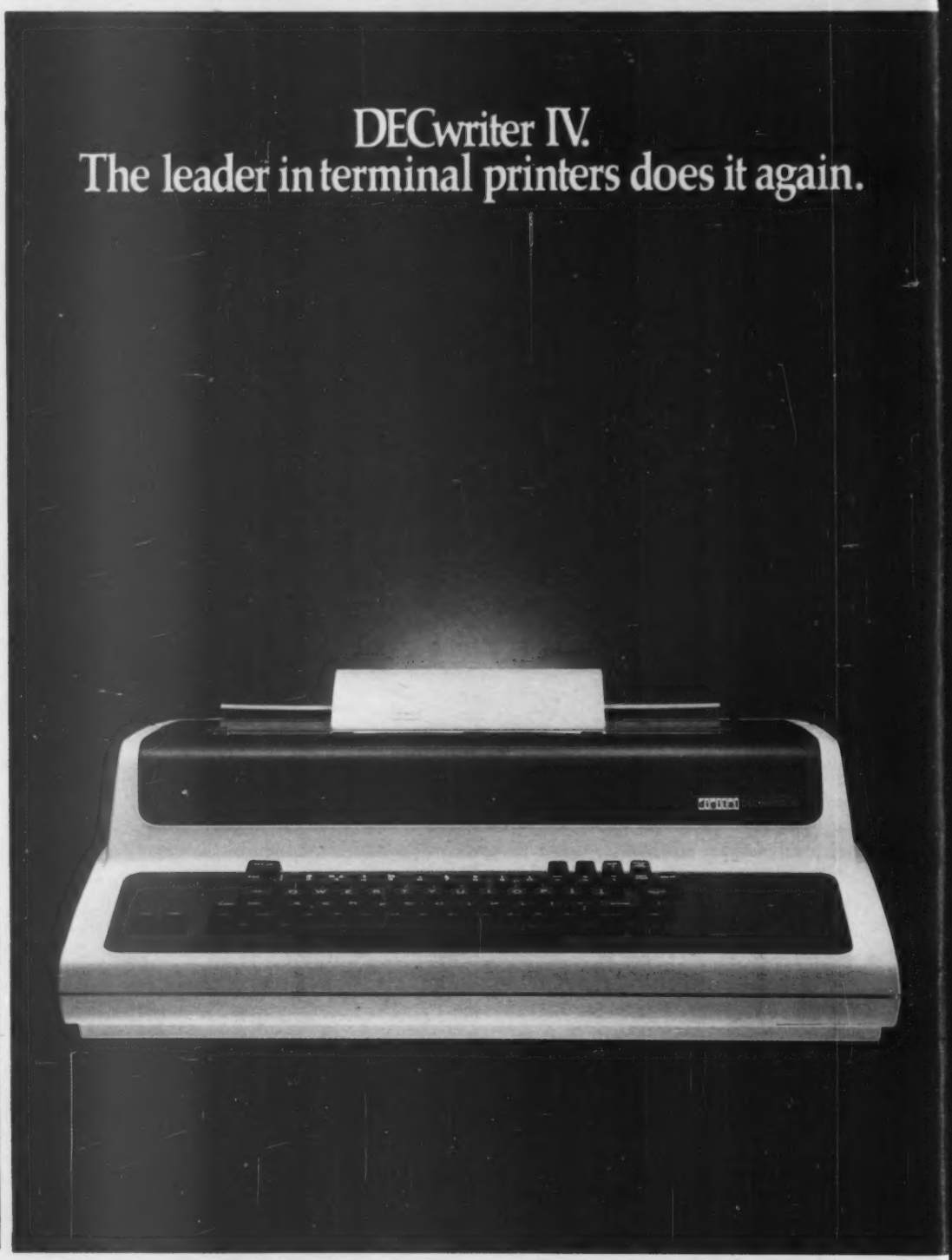

Berlin in the Fall, Anyone?

WASHINGTON, D.C. — U.S. participation is being sought for the International Congress for Data Processing (IKD), to be held in Berlin this fall.

This year, IKD — a congress held in Germany every two years — has as its theme "Mastering Information Technology — Challenge of the '80s." The conference will include more than 100 technical sessions and feature exhibits by major DP manufacturers with a special emphasis on software vendors.

Major IKD topics will be software applications, DP and education and DP in the workplace. The last topic will cover such subjects as unemployment, women in DP and reorganizing management structures to facilitate automation, according to conference officials.

IKD '80, scheduled for Oct. 7-10, is being organized with the cooperation in the U.S. of the Association for Computing Machinery and the Association of Consulting Management Engineers.

More information on the conference can be obtained from Dieter H. von Schramm, AMK Berlin, Suite 718, 1735 Eye St. N.W., Washington, D.C. 20006.

Informatics Forms Mini Software Unit

WOODLAND HILLS, Calif. — Informatics, Inc. has established a minicomputer applications unit within its Software Products Group.

The unit's first product is a general ledger system designed for the IBM System/34 and the Hewlett-Packard Co. HP 3000. Until now, most of the firm's software products have been marketed to users with large IBM mainframes.

With the establishment of the minicomputer software unit, Informatics is broadening its product offerings, a spokesman said. In the future, the firm expects to offer software products for other major mini makers.

Consisting of four professionals, the new unit is headed by Donald K. Lane, vice-president and general manager. Lane joined Informatics after having been with Software International Corp.

Loses Contract

In another announcement, Informatics said it had lost its facilities management contract with the National Aeronautics and Space Administration's (Nasa) Scientific and Technical Information Facility, a contract which the company had held for the past 12 years.

Although Nasa has awarded the contract on a competitive bid basis, Informatics was for many years the only bidder. Last year, however, Planning Research Corp. did bid on the contract, which was awarded to that firm solely on price consideration, the Informatics spokesman maintained.

Pretax profits for that contract have approximated $400,000 per year. "The loss of this contract had been expected, and it will affect 1980 results by no more than the half-year contract profits, approximately $200,000," Informatics President Walter Bauer said.

Revenues for Informatics' first quarter rose 15% to $29 million. Earnings for the period were $419,000 or 17 cents per share, up from $390,000 or 15 cents per share in the same quarter a year ago.

Supershort

Modular Computer Systems, Inc. has completed joint-venture arrangements with AEG-Telefunken. The new firm, ATM Computer GbmH, opened its doors April 1 in Munich. The new firm will carry Modcomp's Classic line of systems and AEG-Telefunken's process computer offerings.

If you know anything about terminal printers, you probably know something about our LA36 DECwriter II—the largest selling 300 baud terminal printer ever made.

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And now there's the DECwriter IV.

With the DECwriter IV, we used the same sound thinking and proven features that made the DECwriter II so successful. True 30 CPS throughput. Microprocessor control. Switch-selectable 110 and 300 baud rates, and solid state components for unmatched reliability.

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Comparable to U.S. by '83

European Services Mart Found Strong, Growing

NEW YORK — Users in Western Europe spent $5.7 billion for computing services in 1978 and expenditures are growing so fast that Western European and U.S. markets will be comparable in size by 1983, a newly published report on computing services in Western Europe predicted.

The "Third Annual Survey of the Computing Services Industry in Europe, 1979" was conducted by Quantum Science Corp., an information services and consulting firm here, on behalf of the European Computing Services Association (Ecsa). Ecsa represents computing service organizations throughout Europe and acts as their spokesman on industry issues.

According to the report, spending for computer services broke down like this:

Batch Services	41.2%
Remote Computing	20.4%
Software Services	24.1%
Software Products	11.4%
Other	2.9%

In terms of revenue, the report found France the largest market ($1.3 billion) followed by West Germany ($950 million) and the UK ($770 million).

The report also indicated that the computing services industry, which has been averaging an annual growth rate of 15%, will soon lead general-purpose computer markets and general-purpose terminal markets.

Major Opportunity

For computing service suppliers, the major opportunity for growth will lie in the integration of hardware and software systems, Quantum Science said. Manufacturing and banking/finance industries will become the major growth industry sectors, it predicted.

The main problems experienced by the Western European computer services suppliers, according to the report, are personnel shortages, acquisition of development capital and competiton from small business systems suppliers. The problem of raising capital is encouraging the growth of common interest groups on a European scale such as the Europool and Data Team groups, as well as on a national level, particularly in France and Italy.

Although U.S. suppliers were found to dominate certain market sectors, particularly system software products and time-sharing services, only three U.S. vendors were ranked in the top 20 Western Europe suppliers.

IBM scored highest among all U.S. and European competitors. The remaining top 20 suppliers by country of origin were France with 11 vendors, the UK with two, Denmark with two, Sweden with one and the Federal Republic of Germany with one.

Examining industry employment trends, the report found that approximately 142,000 employees were engaged in computer services in Europe in 1978. Companies in France and the UK employed approximately 31,000 workers, a figure almost double that of the number of employees in west Germany and Italy, according to the report.

The Ecsa survey includes details on individual countries and the relationship between their governments and their postal, telegraph and telephone authorities. A list of the top 10 suppliers in each country is also provided.

The report is published in English, French and German. It costs $125 to Ecsa members and $225 to nonmembers and is available in the U.S. from Mirek Stevenson, Quantum Science Corp., 1114 Ave. of the Americas, New York, N.Y. 10036.

DEC Makes Large Gains in Third Quarter

MAYNARD, Mass. — Digital Equipment Corp. reported a 35% increase in revenues and a 45% increase in earnings for its third quarter.

Third-period earnings totaled $66.9 million or $1.45 per share, up from just over $46 million or $1.07 per share in the year-ago quarter. Revenues totaled $627.2 million compared with $465.9 million in the same period a year ago.

For the nine months, DEC's earnings swelled 43% while revenues grew 30%. Revenues for the first three quarters totaled $1.67 billion vs. $1.28 billion in the same three quarters in Fiscal 1979.

Earnings reached just over $166 million or $3.68 per share, up from $116.7 million or $2.70 per share in the corresponding three quarters last year.

"While our incoming orders have continued just as strong as in the previous two quarters, we are remaining flexible in order to be able to react to any [economic] changes that may occur," DEC President Kenneth H. Olsen said.

Olsen also noted that business was particularly strong for microcomputer products and for the high-performance VAX-11/780 products.

With demand still running ahead of internal forecasts, the company said it has been working with its customers to minimize the impact of long lead times.

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[3]WORD-11 is the trademark of Data Processing Design, Los Angeles, CA

Executive Corner

• Fred Lewis has been named vice-president of engineering for Zentec Corp.

• Applicon, Inc. has appointed Thomas E. Genova to the newly created position of vice-president of engineering.

• Lawrence M. Codacovi has been elected executive vice-president of international services and Francis J. DeRosa has been elected executive vice-president and general counsel of law and regulatory affairs for RCA Global Communications, Inc.

• James R. Keener has been named director of marketing at the Industrial Products Division of Computer Automation, Inc.

Manufacturing Data Systems, Inc. has announced the promotion of three executives. John C. Hall is now vice-president of sales, Charles F. Raber is vice-president of engineering and Robert J. Samson is director of advanced market segment.

• Harris Corp.'s PRD Electronics Division has announced the promotions of James J. Kelly to vice-president of advanced systems development and Ernest F. Martino to vice-president of programs.

• James Landon has been named vice-president of marketing for the Business Communications Group of Northern Telecom Systems Corp.

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Contracts

Rockwell International's Electronic Systems Group has been awarded a one-year contract valued at about $1.6 million for the definition phase of the Defense Department's Very High-Speed Integrated Circuit (VHSIC) program. Teamed with Rockwell International is Sanders Associates, Inc.

Okidata Corp. has been awarded a $1.5 million contract to supply 14-in. Winchester disk drives to Ohio Scientific, Inc. The 80M-byte Okidata 3300 series drives will be used in Ohio Scientific's Challenger III-based distributed processing network.

The U.S. Navy's Naval Sea Systems Command has awarded a $16 million contract for AN/UYA-4 display consoles to Hughes Aircraft Co. The contract is part of a $90 million in-house program for Naval Tactical Data Systems equipment aimed at equipping more than 100 ships and shore installations of the U.S. Navy and its allies. The initial contract calls for eight ship sets of the consoles and peripheral equipment for guided missile fast frigates.

Digital Communications Corp. has received a contract in excess of $15 million from Cylix, a Digital Equipment Corp. subsidiary, for more than 200 transmit/receive 4.6 meter Dynac earth stations to be installed at 100 locations throughout the continental U.S. The contract also includes a dual 10-meter earth station and a specially designed communications processor to be installed with satellite transmission equipment. Installation of the stations will begin at the end of this year.

Cipher Data Products has been awarded a $3.5 million contract for its 75 in/sec Series 900 vacuum column tape drives by Basic Four Corp. The tape drives will be used as disk backup for Basic Four's interactive business systems, for production of tapes and as an addressable peripheral in conjunction with distributed data processing sales.

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NCC Debut Set for Protos

(Continued from Page 59)

ever, Watson envisions the firm incorporating this option in the near future.

"Hardly any OEMs use one system today. They usually carry at least one mini and one micro," he pointed out.

Targeted primarily at OEMs with eight to 10 software developers, the bundled system includes a Naked Mini 4/97 processor with up to 8M bytes of main memory, the operating software, a printer, up to four hard disk storage units and terminals. Depending on the configurations, the system will be priced in the $80,000 to $120,000 range.

Another NCC Debut

While Protos is available only as a bundled system, the firm will also introduce its high-end Naked Mini 4/95 at NCC. This CPU is essentially the same as the 4/97, Watson said.

Watson labeled the 4/95 and 4/97 "superminis" although they are not 32-bit machines. The 4/95 will be sold strictly as iron to CA's traditional OEM customers.

The 4/95 and Protos are CA's high-ticket entries, Watson noted, adding that at least half of the company's revenue growth must come from the high-priced lines.

CA expects Protos to stimulate sales from systems houses, which currently account for only 10% of the Naked Mini Division's revenues. Watson expects this segment to produce 30% of the division's revenues within the next couple of years.

Road to Recovery

Although CA's total revenues have held their own, earnings have been disappointing for the past year. But it appears CA's earnings are now on the road to recovery.

For its third quarter, CA earned just over $1.5 million or 78 cents per share compared with $165,000 or 8 cents per share in last year's quarter.

CA posted quarter revenues of $20.8 million compared with $18.4 million in the year-ago quarter.

For the year to date, CA's revenues total $58.8 million, up from $50.5 million in last year's first nine months. Earnings are just over $3 million or $1.51 per share compared with a loss of $313,000 or 15 cents per share experienced in the 1979 nine months.

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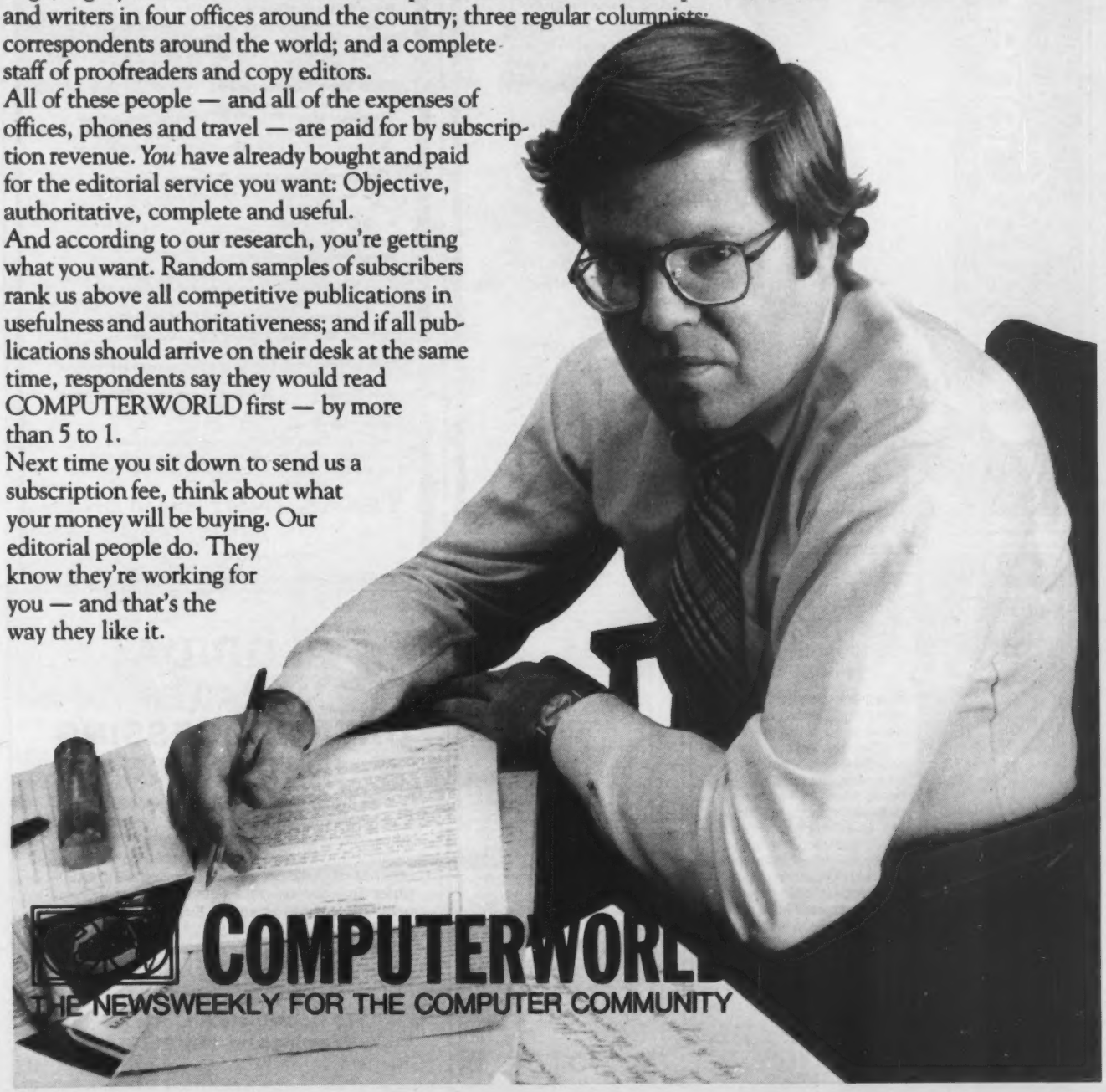

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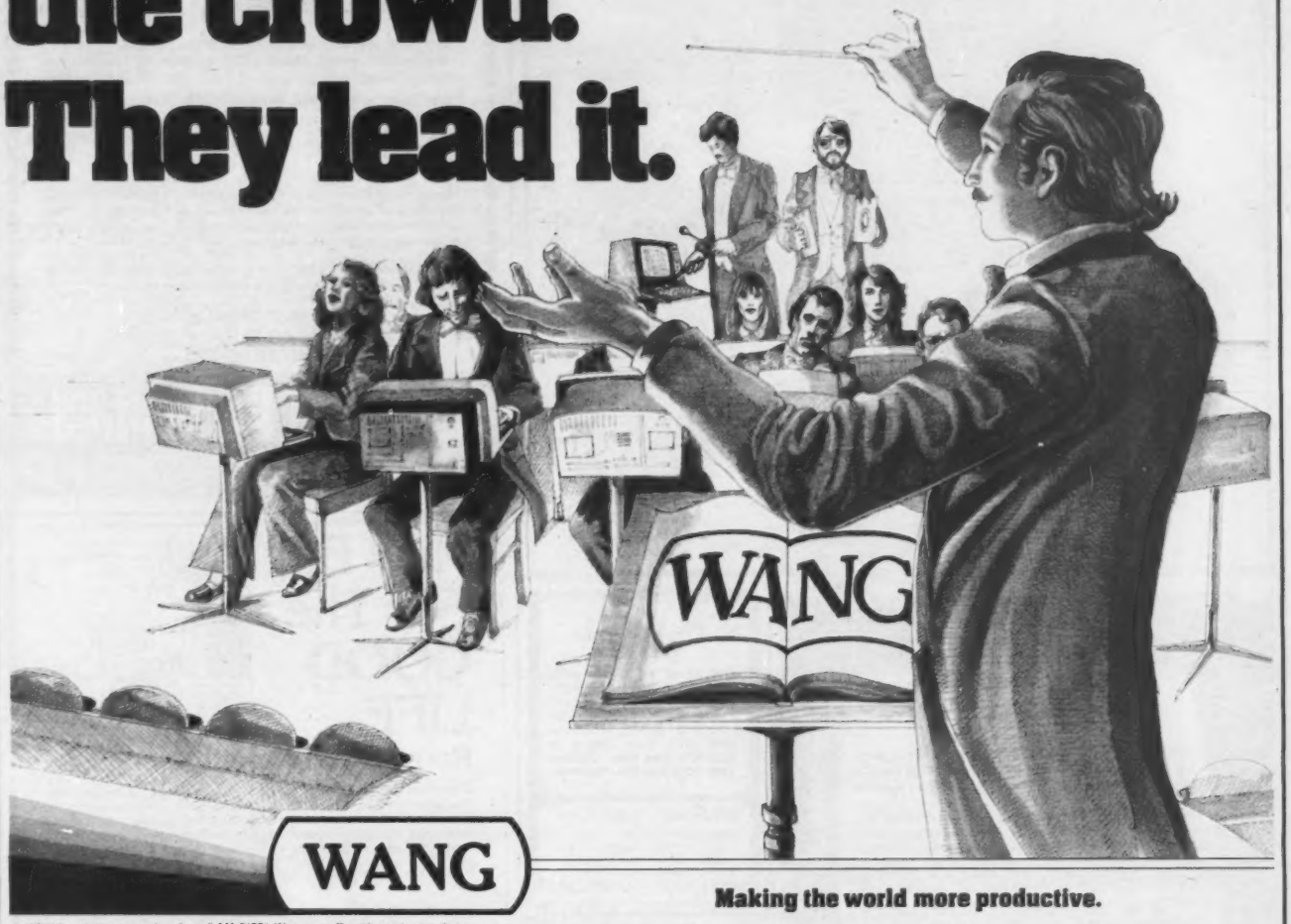

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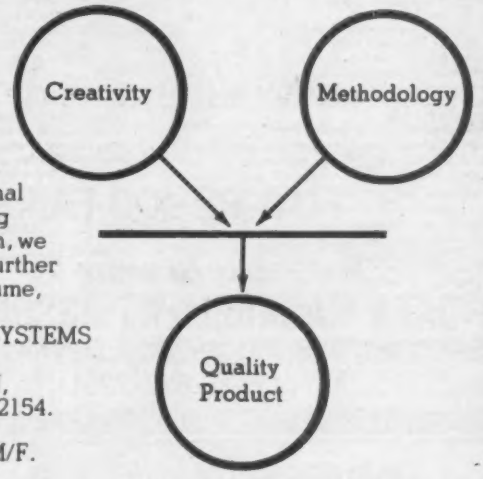

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Aetna Life & Casualty Co.
Allied Van Lines
American Cyanamid
Atlantic Richfield Co.
AT&T Long Lines Dept.
Bell Labs, Inc.
Cadence Industries Corp.
City of Los Angeles
Columbia Presbyterian Hospital
Computer Sciences Corp.
Conn. General Life Ins. Co.
Dow Jones & Company, Inc.
Dun & Bradstreet, Inc.
Educational Testing Service
Emerson Electric
First National Bank of Boston
Florida Software Services, Inc.
Flying Tiger Line
Hughes Aircraft
Informatics, Inc.
JC Penny
Lockheed Missiles & Space Co.
NYC Human Resources Administration
Panasonic
Peerless Insurance
Royal Globe Insurance Co.
Security Life of Denver
Sunkist Growers, Inc.
The Hertz Corporation
The Singer Company
TRW
Twentieth Century Fox
Upjohn Company
Union Labs Life Ins. Co.
Warner Lambert Co.
Walt Disney Productions
Western Electric Co.
Western Gear Corp.

FUTURE JOB FAIRS

July-Philadelphia
August-San Francisco
August-Detroit
September-Dallas
September-Boston
October-Houston

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DATA MANAGEMENT ASSOCIATES

15 Godwin Ave., Ridgewood, New Jersey 07450

(201) 652-7751

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career search opportunities

$18,000-$50,000

DIRECTOR, SYS. & D.P. TO $36,000. Leading div of "Fortune 500" co seeks exp'd pro to direct DP efforts. Degree w/10 yrs exp w/emphasis on mfg applications data base design in large shop environment. Refer RN.

MED. INSTRUMENT SOFTWARE TO $32,000. Prestigious corp needs exp'd software design engr w/future mgmt potential for their fastest growing multi-hundred million $ medical electronics div. Attractive Mid-Atl suburban location. Refer HG.

DATA BASE ADMIN. to $30,000. "Fortune 100" Corp Computer Center seeks candidate to develop on-line data base information systems/DBMS libraries. IMS/TOTAL preferred. Metro location. Refer AT.

SR. SYSTEMS to $30,000. Billion $ prestige mfg corp in choice VA location seeks Sr. Analyst w/exp in financial, accounting, payroll or inventory areas. Exceptional growth oppty. Refer DM.

MGMT. SOFTWARE DEVELOPMENT to $30,000. "Fortune 500" Systems Control div seeks supervisory candidate to direct development of distributed computer systems. Real-time process control environment. Ideal metro location. High visibility position. Refer At.

ANALYST to $30,000. We currently have numerous oppty's for Analysts & Programmers at most levels of exp. Financial & Mfg Systems preferred. All costs paid by client companies. Refer JS.

SR. SUPPORT ANALYST to $29,000. Atlanta computer service co seeks a "senior troubleshooter" to assist in all phases of application dvlpmt. Individual will be both an individual contributor as well as a "team player" depending on scope of the project. Req's 7+ yrs heavy tech bkgd. Honeywell, GCOS w/ IDS-1 a "must." Excellent growth oppty. Refer RS.

CONTACT OUR NEAREST OFFICE ABOUT THESE AND OTHER FEE-PAID OPPORTUNITIES. OUR UNIQUE, COMPANY-OWNED OFFICE SYSTEM ASSURES PERSONAL, CONFIDENTIAL SERVICE.

PHILADELPHIA, PA 19102 — S. Burns, 1500 Chestnut St., 215/561-6300
ATLANTA, GA 30040 — R. Spang, 47 Perimeter Center, 404/393-0933
BALTIMORE, MD 21204 — K. Nelson, 409 Washington Ave., 301/296-4500
CHARLOTTE, NC 28202 — J. Schwab, 1742 Southern Nat'l Ctr., 704/375-0600
CLEVELAND, OH 44131 — A. Thomas, 5755 Grange Road, 216/749-6030
McLEAN, VA 22101 — D. Miller, 7921 Jones Branch Drive, 703/790-1200
NEW YORK, NY 10020 — H. Shanahan, 1211 Ave. of the Americas, 212/840-8600
PITTSBURGH, PA 15222 — J. Beck, 4 Gateway Center, 412/232-0410
PRINCETON, NJ 08540 — J. Dean, 3490 U.S. Rt. 1, 609/452-8130
WILMINGTON, DE 19810 — H. Greene, 2411 Silverside Rd., 302/478-5130
HOUSTON, TX 77096 — G. Smith, 3000 Richmond Ave., 713/523-5004
LOS ANGELES, CA 90017 — W. McNichols, 707 Wilshire Boulevard, 213/683-3001
SAN FRANCISCO, CA 94111 — W. McNichols, 601 Montgomery Street, 415/392-4333

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UNIVERSITY OF HARTFORD

invites applications and nominations for the position of

DIRECTOR OF ACADEMIC COMPUTING

The University of Hartford is an independent, coeducational, non-sectarian urban university, founded in 1877, the University is located in Connecticut, minutes from downtown Hartford, on an attractive 200-acre campus. It consists of eight colleges, offering over 70 major areas of concentration in liberal arts, engineering, business, education, music, art, and electronic technology. Approximately 4,200 full-time day undergraduate, 3,200 part-time day and evening undergraduate, and 2,800 full- and part-time graduate students are enrolled at the University. Of these, 1,800 reside in modern dormitories filled to capacity.

The University of Hartford has recently ordered a Digital Equipment Corporation VAX 11/780 computer system. In addition, a new computer center is planned for construction in the near future. We seek a dynamic and competent individual to provide the necessary leadership to develop and direct an academic computing facility. This Director will report to the Provost and work with an Academic Computing Advisory Committee. The requirements for the position include:

1. Master's degree required - Ph.D in appropriate discipline preferred. A faculty appointment is possible.
2. Experience with the operation of an academic computer center.
3. Experience with DEC equipment and/or VAX 11/780 computer preferred.
4. Ability to organize and run faculty workshops.
5. Knowledge of several computer languages and educational software packages.
6. Good sense of humor and effective interpersonal skills.

Applications including a resume, description of present position, and three references should be received by May 15, 1980. Respond to:

Dean James S. Vinson
College of Arts and Sciences
University of Hartford
West Hartford, CT 06117

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OPERATIONS RESEARCH ANALYST

Highly respected consumer goods org. (suburban) seeks O/R specialist with hvy. modeling and simulation bkgrd. for capacity planning & economic forecasting. Corp. staff position with hi-visibility to Sr. Mgmt. Salary $32,000 range. Fee Paid. Contact Gerry Battista.

Robert Half of Boston, Inc.
100 Summer Street
Boston, MA 02110
(617) 423-1200
Personnel Consultants

SYSTEMS ANALYST DATA COMMUNICATIONS

Position involves design and implementation of university online applications. Desired background includes experience with telecommunications software, Assembly language and COBOL; preferably in an academic environment. Word processing experience helpful. Send resume, references and salary requirements to **Marisa Probish, Computer Center Director, Morgan Hall, Bradley University, Peoria, Illinois 61625.**

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SYSTEMS PROGRAMMER DENVER

The Board of Water Commissioners in Denver, has an immediate opening for a Systems Programmer to perform duties relating to the software of EDP equipment.

The position involves designing new and modifying existing software systems, advising all levels of EDP personnel on utilization of software and hardware, and developing specialized subroutines and related tests.

The relevant college degree is required with three years experience in Assembler language programming on a UNIVAC 1100 machine, or the equivalent.

Starting salary of $1791/month with periodic increases based on performance, and outstanding company benefits. The selected individual must reside within the corporate boundaries of Denver within 9 months of employment.

Denver offers unlimited recreational facilities and cultural opportunities in a Rocky Mountain location that is unsurpassed. Send resumes to the Personnel Office.

DENVER WATER DEPARTMENT
1600 West 12th Avenue
Denver, Colorado 80254
An Equal Opportunity Employer

S/34 PROGRAMMER/ANALYST

Experienced in RPG II for a growing System 34 installation. Highly visible position requires initiative and ability to interface with other personnel. Familiarity with System 34 utilities a plus.

Excellent starting salary and a comprehensive benefits package including 3 weeks paid vacation and bonuses.

Send resume, in complete confidence, or apply in person to Vincent Santosuosso, (617) 523-8000.

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(Positions listed are not available at all locations.)

Professionals with experience in one or more of the following specialities are preferred for above positions:

- IBM 370/168, 3033
- Honeywell 6080
- IMS Data Base Design
- Teleprocessing
  - OS/MVS
  - JES 2/ JES 3
  - CICS
  - IMS
- TSO
- VTAM
- JCL
- Structured Programming
- Panvalet
- COBOL
- FORTRAN
- ALC

For further details on the above or other positions within our Company, call or send resume to the data center you are interested in.

GTE Data Services

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Marketing Support Specialist

Join Intel in Phoenix

Intel is the recognized leader in not one but four major electronics product areas: semiconductor memory components, microprocessors, microcomputer systems, and memory systems. From the very beginning the atmosphere at Intel has been an exciting one filled with constant new technological developments. As a result, our growth rate has been astounding creating many new and demanding positions.

Our Commercial Systems Division located in Phoenix Arizona has an immediate opportunity for a marketing support specialist.

You will be responsible for the technical marketing support of a solid state disk product line, which necessitates a broad base knowledge of large scale IBM operating systems (MVS, VM, TSS and TSD) as they relate to IBM disk peripheral devices. Experience in marketing support in a technical capacity with a large end-user company is ideal. A college degree is preferred, but not required. A minimum of 5 years experience in large 370/303X IMS, TSD and MVS necessary. Experience with a IBM plug compatible vendor in marketing support is preferred.

Please send a resume, in confidence, to Francie Kipling, Intel Corporation, Dept.#19AC, 6401 W. Williams Field Road, Chandler, Arizona 85224. An Equal Opportunity Employer m/f/h.

intel

SENIOR ANALYST

RECESSION PROOF Utility Firm with nearby New Jersey data center. 3+ years COBOL programming, analysis and design experience. Aid in evaluation and development of financial, marketing and manufacturing systems in 370/145 DOS/VS CICS environment. Career oriented.

$30,000 FEE PAID

BASIC

Career climbing opportunity for up-and-coming technical pro. 1+ years BASIC programming, timesharing and statistical applications experience. Responsibilities include development and enhancements to marketing and statistical systems. Rapid advancement possible.

$23,000 FEE PAID

BAL COBOL

Outstanding growth potential with well respected Specialty Distribution Firm. 2+ yrs COBOL or BAL programming experience. Sysgen experience is a plus. Highly visible position reports to project leader. 370/145 DOS/VS.

$31,000 FEE PAID

Call Marty Amato or Peggy Cooper

ROBERT HALF
EDP DIVISION, INC.
522 Fifth Avenue
New York, N.Y. 10036
212-221-0990 (agency)

ASSISTANT/ASSOCIATE PROVOST FOR COMPUTING

The Assistant/Associate Provost for Computing is responsible for overseeing all computing performed at the University of Delaware. Generally, he/she supervises academic and administrative computing, planning for long-range computing needs, and fiscal and personnel management. The directors of Administrative Services, Operations, Research Services, and Instructional Computing report to him/her, enabling him/her to concentrate on major policy issues and planning. The position reports directly to the University Provost.

Qualifications include the Ph.D. or equivalent; academic training and experience to be eligible for faculty appointment; demonstrated academic and administrative leadership; ability to communicate effectively and clearly in both oral and written presentations. Salary: commensurate with qualifications. Starting date: July 1, 1980, or soon thereafter. Applications, including resumes and names of at least three references should be sent to Provost L. Leon Campbell, University of Delaware, Newark, DE 19711, by May 30, 1980. The University of Delaware is an Equal Opportunity/ Affirmative Action Employer that encourages applications from minorities and women.

ADIRONDACK FOOTHILLS

In four years, the staff of Mc² has grown by a factor of 10, spurred by the satisfaction of our customers. We are still growing and are looking for solid computer professionals to augment our DoD systems group. We are currently seeking people with computer systems evaluation experience and/or strong graphics background. Our work is in the areas of: computer system support to military intelligence data handling and analysis, automated cartography, office automation, advanced computer systems architecture, advanced data base management concepts, pattern recognition, graphic systems design, and minicomputer systems performance monitoring and evaluation.

Mc² is located in a peaceful community of 50,000 in Central New York State, within a short distance of the Adirondack Mountains where the skiing, fishing, and hunting are excellent.

If you would be interested in joining a dynamic and growing company with excellent benefits and opportunities for advancement, please send your resume to:

MEASUREMENT CONCEPT CORPORATION
1721 Black River Blvd.
Rome, NY 13440

PROGRAMMER ANALYSTS

(3 positions)

$23,003 - $28,239/yr.

HEWLETT-PACKARD 3000 III

The City is seeking quality candidates with cobol experience for the maintenance of current and development of new on-line municipal applications. HP programming experience is very desirable. Work hours available are: 8 hours - 5 days or 10 hours - 4 days per week.

COMPUTER OPERATOR

(1 position)

$13,955 - $16,969/yr.

Responsible for the operation of an HP-3000 III Computer including associated peripherals, tape library and Data Processing supplies. HP 3000 operation experience, graduation from operator school and municipal application experience are desirable.

General Information

The City offers excellent growth potential and a comprehensive benefits package including a fully paid State of California retirement plan (no social security deduction). The City offers salary increases through the above range in 5 steps over three years. In addition, there are annual cost of living increases each July.

Filing Date: Open

Send resume or apply:

Personnel Services Office
City of Beverly Hills
450 N. Crescent Drive
Beverly Hills, CA 90210
(213) 550-4837

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Our national software service in Colorado Springs can provide remote diagnosis and technical consultation to our customers throughout the U.S. and Canada.

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Now you can share in our dramatic growth.

We're looking for people with at least 2 years of software experience, good interpersonal skills, and a background in a time-sharing, real-time, or distributed processing environment.

As a key member of our winning team, you'll be able to consult directly with our customers at the applications or systems programming level—researching, structuring and communicating solutions to complex and varied software problems.

You'll enjoy top rewards.

We'll provide you with a fully competitive salary/benefits package and relocation assistance to Colorado Springs, an area with clean mountain air and a reasonable cost of living.

You'll also experience all the growth your success deserves.

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Our lines will be open from 8am-6pm, Monday-Friday. Dial (303) 599-4111, ext. 2470. Ask for Bo Beal, Recruiter, Software Telephone Service Center.

Or send your resume to Bo Beal, TSC/DDC Personnel, Digital Equipment Corporation, 301 Rockrimmon Blvd. So., Colorado Springs, CO 80919.

Or plan to meet with us in Anaheim, California, May 19-22. Make an appointment in advance by calling the number listed above.

We are an equal opportunity employer, m/f.

digital

SYSTEMS PROGRAMMERS

Your Career Takes on A Different Meaning in Florida!!!

Our nationally known clients, located throughout the Gulf Coast of Florida, are currently seeking experienced System:s Programmers. The successful candidates will be experienced in IBM, VM, DOS/VS, DOS/VSE, VSI, MVS and assembler languages; and will possess the background necessary to lead the Systems Software effort in a VM environment.

Salaries are competitive, the assignments are challenging and the opportunities for personal and professional advancement are realistic. Please submit your resume, in confidence, or call:

813-872-1853

frank leonard personnel
1211 N. Westshore Blvd., Suite 100-CW
Tampa, Florida 33607
Our Clients are Equal Opportunity Employers with client company paying all fees

SANTA FE ENERGY COMPANY

Excellent career opportunities exist in the Information Systems Department. We are seeking qualified applicants in search of a fast-moving progressive organization they can grow with. We will be installing a 370/168 6 meg CPU this spring with an intent to upgrade to MVS later this year. The department will undergo major expansion of on-line systems in several areas of company operation during the next two years. These positions offer a challenging environment and the opportunity for personal development and career growth.

Systems Analysts

Programmer/Analysts

Programmers

Experience is required in systems design and programming using COBOL, FORTRAN, and DBMS techniques. Applicants should have a minimum of two years experience with IBM OS operating systems. Experience with ADABAS and on-line systems is desirable. Personnel with a background in all areas of engineering, production, or inventory systems are needed.

Systems Programmer

We require an experienced MVS systems programmer with a minimum of two years actual experience. A working knowledge of COBOL, FORTRAN ASSEMBLER, OS/JCL and utilities is required. Experience with data base systems, data communications, VSAM, VTAM, and performance evaluation would be an asset.

We offer competitive salaries and excellent company paid benefits including health, dental, life, retirement and disability. Qualified applicants send resume to:

Personnel Department
SANTA FE ENERGY COMPANY
One Security Park
7200 I-40 West
Amarillo, Texas 79106

DIRECTOR - INFORMATION SYSTEMS

Dynamic, progressive central Massachusetts teaching hospital is seeking an experienced DP professional to assume full responsibility for an expanding Information Systems Department, which will shortly replace a System/3, Model 15D with a System 38 as part of the on-going development of a comprehensive on-line information system.

Applicants should possess a Bachelor's degree and have 5 or more years' experience in Data Processing Management. Health care DP experience is highly desirable, preferably with System/3 and CCP exposure. Must have a demonstrated ability in systems analysis. Master's degree considered a plus. Managerial experience should include a proven ability to select, train, motivate and retain qualified professionals and develop a cohesive and effective team. Individuals who are people-oriented and have demonstrated aptitude in both written and oral communications desired.

Compensation arrangements include both highly competitive salary and liberal fringe benefits.

Our employees are aware of this opportunity.

Please forward resume, including salary history to:
CW Box 2281
375 Cochituate Rd., Rte. 30
Framingham, Ma. 01701
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UNIVERSITY OF RIYADH COMPUTER CENTER

Riyadh University requires the following DP professionals to support 3033N/MVS/JES2/TSO/VTAM/ACF

MVS SYSTEM PROGRAMMERS:

Minimum 3 years MVS/TSO experience in SYSGEN, PUT, SUS installation and debugging must be very knowledgeable in MVS internals, JES2 MVS performances, VSAM, IPO and MVS related program products and productivity aids. Must have good command of ALC. Knowledge of ACF/VTAM would be an asset.

NETWORK CONTROL SUPERVISORS:

Minimum 5 years experience in DC hardware installation, trouble-shooting network planning etc. Must be very knowledgeable in 3705, 3270 family and related hardware. In depth familiarity with SDLC, SNA and BSC protocols. VTAM/ACF background would be an asset.

Please forward a copy of a recent resume to:

DIRECTOR, COMPUTER CENTER
ADMINISTRATION BUILDING
UNIVERSITY OF RIYADH
P.O. BOX 2454
RIYADH, SAUDI ARABIA

NEW OPPORTUNITIES

Waters Associates, the leader in the manufacture of liquid chromatography instrumentation, seeks candidates to meet its growing needs in the following areas.

Peripherals Operator

Previous experience under VM/DOS-VS, POWER and CICS is a must. Several shifts available.

Computer Console Operator

Assist console operator in a training environment while operating peripherals such as readers, printers, tapes, disk and forms-handling equipment. Some previous experience necessary.

Please send your resume including salary history to Diane Niles or call Diane COLLECT at 617-478-2000 for immediate information.

Waters Associates, Inc.
34 Maple Street
Milford, Massachusetts, 01757
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ROBERT HALF

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New DP career growth positions are listed with our Houston office almost daily from small to Fortune 100 companies.

Examples below:

Perf Measurement to $40,000

Sys Programmer to $35,000

IMS DBA to $40,000

Systems Analyst to $31,000

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Strong economy, super schools and warm climate!

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EDP DIVISION
720 N. Post Oak Rd. #228
Houston, Texas 77024

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Responsible for administrative data processing, coordinates computer services to faculty, students. Develops data processing priorities. Selection criteria includes programming, systems design, management experience, preference to experience in academic setting. Competitive salary.

Send letter, resume, salary requirements, three reference names by 6/1/80 to: Patricia Hayes, Director of Administration & Planning, College of Saint Rose, Albany, New York 12203. AA/EOE

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Once again, we've outdone ourselves. While the rest of the Silicon Valley worries about the possibility of recession, Advanced Micro Devices just keeps getting bigger and better.

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PROGRAMMER/SYSTEMS ANALYST

Consideration for this vital position will be given to all applicants with the following qualifications: BS, BA or equivalent experience; knowledge of COBOL on IBM OS; and 3-7 years' working background in the development/support of computer software systems. Primary responsibility will be in the design and development of in-house business information computer software systems achieved through the application of computer capabilities, user needs and information processing techniques.

MIS TELECOMMUNICATIONS ANALYST

Will analyze computer hardware and data communications requirements for data processing systems. Coordinating procurement/installation and providing teleprocessing support of these systems are additional responsibilities. The individual we select must stay current with developments in hardware and data communications technology in order to provide recommendations in these areas. Position requires 4-6 years' working background in data communications, computer hardware/software and teleprocessing systems. BS degree in Data Processing or equivalent experience to your advantage.

TECHNICAL SYSTEMS ANALYST

Will plan, design and implement technical solutions to data processing projects involving data communications and systems hardware/software. Prefer BS in Computer Science or Engineering, along with 3-5 years' experience in data communications, computer hardware, teleprocessing and system software (Burroughs, IBM and HP).

MANAGER SYSTEMS PROGRAMMING

The vast experience you will bring to this position will provide direction to the systems programming activities of our Information Services Department. Your concerns will be in the areas of data communications, data base and hardware evaluation.

We prefer an individual with no less than 10 years' experience in a technical support capacity (with emphasis in project management/control and systems programming on IBM OS systems). Degree in Computer Science or Engineering highly desirable.

IBM SYSTEMS PROGRAMMER

For this position we would prefer a BS in Computer Science or Engineering, in addition to 6 years' experience with IBM internals, data communications and data base support. Responsibilities include problem solving, performance analysis, configuration planning, training and system release installation.

BURROUGHS SYSTEMS PROGRAMMER

Prefer BS in Engineering or Computer Science, with 4 years' experience (or equivalent) with Burroughs medium systems, COBOL, NDL, Assembler and data communications. Will analyze systems problems (hardware, software and data communications) on in-house dual medium systems, and resolve problems by interfacing with appropriate hardware/software vendors. In addition, will perform general systems software maintenance, performance evaluation and assist on hardware/software long-term planning.

New Computer Science graduates interested in IBM OS business applications or systems programming are encouraged to send resumes.

Aside from a comfortable environment that stresses individual achievement and growth, AMD offers as competitive a compensation package as you'll find in the business. Prompt, professional consideration is guaranteed to all candidates who forward a detailed resume, outlining salary history and requirements, to Frank Goudaillier, Advanced Micro Devices, 901 Thompson Place, P.O. Box 453, Sunnyvale, CA 94086. Equal Opportunity Employer M/F/H.

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DATA PROCESSING SECURITY ADMINISTRATOR

This newly created position offers a ground floor opportunity for the qualified data processing professional. The position is responsible for the direction of all Administrative Computer Center Data Processing Security Activities. A wide variety of challenging tasks are incorporated in this function. The environment consists of a 3033, 370/158 with MVS, IMS, CICS, TSO and many other state-of-the-art technologies. ACF2 installation will take place during mid-1980.

Candidates should have a college degree plus five years experience in a progressive data processing environment. ACF2 or RACF exposure is a plus. Salary level will be commensurate with education and experience, plus an excellent benefits package and a liberal relocation plan.

Kalamazoo is a medium-sized southwestern Michigan city midway between Detroit and Chicago, offering an excellent mix of cultural, educational, and recreational pursuits.

Please submit resume, including salary requirements to:

Kathleen diCicco
The Upjohn Company
7000 Portage Rd.
Kalamazoo, MI 49001

Upjohn

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DIRECTOR OF SOFTWARE

Our client: division of a diverse company located in a major U.S. city.

Responsibilities: will be totally responsible for structuring and implementing our client's business plan which will enable the company to announce and develop CPU/microbased hardware/software products. These products will be directed towards the office automation marketplace. You will manage an interdisciplinary group of 50 software professionals. Background must be in full cycle product development. Your career goal must be toward general management in the very near future.

Compensation: package $50 - $60K plus a comprehensive relocation allowance.

Contact: Michael O'Keefe, Senior Associate.

Call **(617) 273-1740** or submit resume. Available Monday and Wednesday evenings until 8 PM (EST).

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COMPUTER TECHNICAL SUPPORT

DRESSER COMPUTER CENTER IS RECRUITING PROFESSIONALS FOR TECHNICAL SUPPORT SERVICES AT OUR LARGE CORPORATE COMPUTER CENTER. OUR ENVIRONMENT CONSISTS OF LARGE SCALE IBM AND AMDAHL SYSTEMS IN CONJUNCTION WITH 30 PLUS RJE USERS AND 800 PLUS ON-LINE CRT TERMINAL USERS LOCATED NATIONALLY AND IN 9 FOREIGN COUNTRIES.

Dresser Industries, Inc. is one of the world's leading suppliers of high technology products and services to international energy, natural resources and industrial markets. Sales exceed $3 billion.
From it's inception in 1972, Dresser Computer Center has grown from two 360/50's to two 8 megabyte 3033's and one 8 megabyte Amdahl. Additionally, a 3 megabyte 370/158 system supports software development activities of the Technical Support Group. About 55,000 people are employed worldwide.

SYSTEMS PROGRAMMERS

With varying levels of experience in evaluating, generating and maintaining MVS Operating sytems, JES, TSO and supporting hardware/software.

CPE SPECIALIST

With varying levels of experience in technical and financial evaluations of hardware and software, performance measurement and tuning using hardware/software monitors on large scale IBM Systems.

COMMUNICATIONS SPECIALISTS

With varying levels of experience in TP monitors large data communication networks, front-end processors, concentrators and supporting software/hardware.

SYSTEM SUPPORT TRAINEES

We are seeking individuals having in-depth knowledge of Basic Assembler language and IBM OS/VS facilities desiring to progress into the challenging computer technical support field.

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- A suburban Pittsburgh, PA work location
- A recession resistant energy product & services company
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THEN please call collect or send a resume in confidence to:

Larry Dunn, Personnel Mgr.
DRESSER COMPUTER CENTER
(412) 928-3960
810 Parish Street
Pittsburgh, PA 15220
An Equal Opportunity Employer M/F

Dresser Computer Center — DRESSER

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Systems Architect

Responsibilities include developing architectures, interfaces and protocols in one or more of the following disciplines: distributed processing, transaction processing, interactive processing, backup and recover, sharing & concurrency control, privacy, security. Requires 6 or more years of extensive OS development for large business systems.

Performance Analyst

Will direct all the measurement and analysis of a major software system. This will include designing performance monitor and synthetic benchmarks, determining capacity and throughput throughout development, and specifying instrumentation. 3 years experience in performance measurement required.

Senior Software Writer

Our fast-expanding Educational Publications staff requires ability to work largely on your own and research, organize, write, and maintain publications documenting a variety of software products being released. Should have BSCS/EE/Business, a solid background in servicing/designing/programming, and minimum of 4 years with software manuals.

Interviews with qualified candidates will be quickly arranged. Phone Mr. Doug Sjoberg, Personnel Resources, collect at (714) 485-3356; or send confidential resume and salary history to his attention at: NCR Corporation, Systems Engineering, Dept. D50, 16550 W. Bernardo Drive, San Diego, CA 92127

NCR
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Tomorrow-minded

UNIVAC APPLICATION ANALYSTS

Martin Marietta Aerospace, NASA's Contractor on the Space Shuttle External Tank, has immediate openings for Univac Application Analysts.

Position requires designing and programming a variety of engineering and specific programs utilizing ANSI/COBOL for application on Univac 11XX equipment.

Qualified individuals should possess a BS in Mathematics, Computer Science, or related discipline, and have a minimum of 3 years scientific and/or business programming utilizing data base methodology.

We offer competitive starting salaries and fully paid company benefits. These opportunities exist at the Michoud Assembly Facility located in Suburban East New Orleans. Qualified candidates interested in learning more about these opportunities at Martin Marietta...the tomorrow-minded aerospace people, should forward resumes including salary history to: Ms. Dottie McCann, Martin Marietta Aerospace, P.O. Box 29304, New Orleans, Louisiana 70189. We are an equal opportunity employer, m/f/h.

MARTIN MARIETTA

Data Processing

SYSTEMS PROGRAMMERS

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Needed immediately — one to do software maintenance on the CRAY 1 and one to do software maintenance on a MODCOMP 11 remote job entry system, and one to do software maintenance and development on Terabit memory mass storage system. REQUIRES: MS or equivalent in Computer Science, EE or Math, two to four years systems programming in meduim-large scale computers OR peripheral and minicomputers respectively, and skilled in assembly language, programming and FORTRAN. Call (303) 494-5151, Marsha Hanson, Ext. 517 or 666.

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Alaska's largest financial institution has several opportunities for experienced individuals in an IBM 370 environment. You will remain technically up-to-date with IBM 3031 and 370/145 hardware while enjoying the casual Alaskan lifestyle. We offer excellent career opportunities with competitive salary and a superior benefit package, which includes medical, dental, vision-and profit sharing.

PROJECT LEADER —

plans and supervises the activities of a project team in all phases of systems analysis, design, programming and testing. Initial assignment will be with a financial management application. Individual must have multi-project management experience in major systems including the use of scheduling tools and manpower planning. ANSI COBOL and IBM 370 OS JCL required.

PROGRAMMER ANALYST —

requires 2-4 years' experience on an IBM 370 OS system with ANSI COBOL and/or BAL experience. Knowledge of banking applications highly desirable.

Please send resume including salary history to V.F. Garvy, NATIONAL BANK OF ALASKA, P.O. Box 600, Anchorage, Alaska 99510. An equal opportunity employer m/f.

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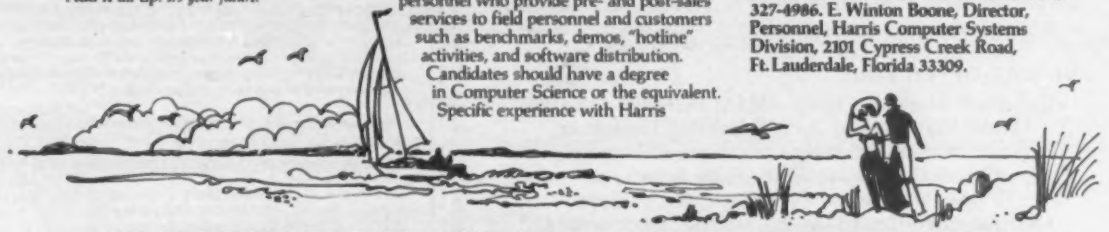
An opening currently exists in our Marketing Department for an experienced manager with a solid scientific software background. Expertise in operating systems, compilers, communications software, with extensive FORTRAN and some COBOL required. You will manage a group of very sharp software analysts and support personnel who provide pre- and post-sales services to field personnel and customers such as benchmarks, demos, "hotline" activities, and software distribution. Candidates should have a degree in Computer Science or the equivalent. Specific experience with Harris Computers and VULCAN virtual memory operating system would be a definite plus.

Field Marketing Support Analysts

Multiple openings currently exist in certain field locations for systems analysts with scientific software experience, preferably in pre- and post-sales environment. If you have a technical degree and applicable experience, we'd like to talk to you about opportunities in New York, Ft. Lauderdale, Melbourne (Fl.), St. Louis, Houston, Dallas, Cleveland, Cincinnati, and Los Angeles.

Please send resume and salary history in strict confidence and/or call: Toll free 1-800-327-4986. E. Winton Boone, Director, Personnel, Harris Computer Systems Division, 2101 Cypress Creek Road, Ft. Lauderdale, Florida 33309.



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You will be responsible for installing, maintaining and enhancing system support software as well as assisting users. The systems include FORTRAN, PL/1, BASIC and SPEAKEASY compilers; IDMS data base systems; QCM performance measurement; and SMF software. You should have a minimum of BS or BA degree, preferably with Computer Science major. Experience with PL/1 and SMP is necessary, and BAL/SMF/TSO/data-base systems experience will be a plus.

GTE offers excellent salaries and a superior benefits package including company paid medical, life and dental insurance, credit union, tuition refund, discount company store, stock options and a savings and investment plan.

Interested and qualified candidates are invited to send their resume with salary history, in confidence, to Jackie Hall, Dept. C55, GTE Laboratories, Inc., 40 Sylvan Road, Waltham, MA 02154.

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Maintaining COMTEN front-end communication control units, trouble-shooting and analysis of network performance data.
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Providing technical support to customers and programming support for internal employees.
REQ: Proficiency in APL; other useful languages (COBOL, PL/1 and Fortran). Familiarity with OS/JCL, VM

SYSTEMS PROGRAMMERS:
Maintaining and enhancing our APL*PLUS VM System.
REQ: Proficiency in Assembler and VM APL useful

VM SYSTEMS PROGRAMMERS:
Developing new system features in CP and CMS from external design specifications. Assisting in external design, doing internal design, code text and preparing modifications for upgrade to production states.
REQ: Experience with internals work on VM 370. Proficiency in VM, APL useful

NATIONWIDE

APPLICATIONS CONSULTANTS:
Designing & implementing APL applications, assisting users in their successful use of our services.
REQ: Bachelor's degree in technical area.
APL proficiency.
Good communications skills

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REQ: Bachelor's degree in a technical field (MBA desirable)
APL proficiency
Good communications skills

If you meet the stated qualifications and are interested in becoming a vital part of an organization where people are the most valuable resource, contact Gayle Abbott, Director of Personnel, at:

STSC, Inc.
7316 Wisconsin Avenue
Bethesda, MD 20014
(301) 657-8220
EOE/M/F

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On-line system DOS/VS shop, 370/138 going 4341. Advance functions/ Power VS Shadow II TP monitor, in-house built data-base, local and remote application.

Looking for a bright Batch Assembler Language Programmer to train in-house for on-line programming. RPG II knowledge a plus. Midtown New York City location. Call:

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PROGRAMMER ANALYST

FLEXIBLE HOURS-4 DAY WORK WEEK-$19-22K,00G

A leading corporate Data Center in New Jersey which is currently running a 3033 and five 370/168's under MVS and JES-3, is presently looking for quality Programmers and Programmer Analysts. You'll have an opportunity to get involved with the design and development of many new on-line system:: which will utilize IMS-DB/DC facilities. You will be able to work with your current COBOL programming skills as well as being able to learn either BAL or PL1. There is a possibility that those individuals interested in the systems programming disciplines will be able to move into those areas in a short period of time. In addition to the benefits already mentioned the company offers: full medical coverage, a dental plan, stock options and profit sharing. Qualified applicants should contact Bill Cook or send resume to:

CENTRAL EDP
512 W. Mt. Pleasant Ave Livingston, NJ 07039
(201) 994-4730 (Evening Interviews Arranged)

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Coastal's continued rapid growth and expansion have created the need for extensive new financial systems development throughout the corporation.

We are actively seeking a Project Leader who can guide and supervise this immense undertaking. The Project Leader must be able to communicate ideas and proposals (written and verbal) to upper-level management.

The successful applicant will possess 6-10 years of experience in definition, design, development and implementation of major EDP financial systems (Cobol) with a degree in Accounting, Business or Finance. An advanced degree, experience in ADABAS, TSO or CICS is a big plus.

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The Coastal Corporation
An Equal Opportunity Employer, M/F

SR. SYSTEMS ANALYST

The concept of Dispersed Data Processing was born at Datapoint and through the combined efforts of our talented people, we've developed one of the most versatile computer families available. We're ahead of our competition even now and pioneering the concept of the Integrated Electronic Office that will support the office of the future. This growth has created a career opportunity for a Sr. Systems Analyst in our SAN ANTONIO headquarters.

We Understand Success...And We're Ready For More!

This individual must have a BS in Computer Science or equivalent with at least 5 years programming experience. Responsibilities will include analyzing systems requirements with users, development of detailed specifications for systems including cost analysis and preparation of status reports. Logistics/inventory application experience an asset. This position offers excellent career potential with high visibility and heavy interaction with users and managers.

Join us in San Antonio, The "Fiesta City"!

San Antonio is in the heart of the Texas "hill-country" and offers a unique lifestyle, affordable housing and a low cost of living. DATAPOINT offers the excellent starting salaries with complete corporate benefits and the kind of career growth that can only be offered by a company with revenues that have grown at a rate of 47% annually over the last five years.

For prompt confidential consideration, please send your resume, including salary history, to: Marianne Palacios, Datapoint Corporation, 9725 Datapoint Dr., MS S63, San Antonio, Texas 78284.

We are an equal opportunity employer M/F.

DATAPOINT

Systems Development Professional

CLIMAX MOLYBDENUM

Due to the continued expansion of our operation, the Climax Molybdenum Company, division of Amax Inc., seeks the addition of a seasoned Systems Professional.

Operating out of our Southwest Fairfield County headquarters, you will be responsible for system design and development on DEC 11/70 and DEC VAX 11/780 equipment. Applications will include commercial, accounting, technical, financial, business and planning functions interacting on an international data communications network. You will also interface with DEC 2060 and IBM 3031 equipment located at out mining operations in Colorado.

Your background should include a B.S./B.A. in Math or other technical discipline, 2 to 5 years experience in applications development and programming under an interactive time-sharing operating system.

In addition to a desirable Fairfield County location, we offer an attractive compensation package and a full range of company paid benefits.

Interested and qualified candidates should submit their credentials in strictest confidence to: R.J. DeBone, Manager Salaried Personnel.

CLIMAX MOLYBDENUM COMPANY
ONE GREENWICH PLAZA,
GREENWICH, CONN. 06830
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A DIVISION OF AMAX INC.

ASSOCIATE PROGRAMMER

Responsible for design and development of software programs involving standard configurations and selected environments for small and large scale computer systems. Tests accuracy of programmed segment. Corrects program errors. Coordinates with other Sperry-Univac personnel. Requires B.S. degree in Computer Science, Mathematics or equivalent plus 1-2 years programming experience, or equivalent education, training and/or related work experience including six months to one year systems experience on large and small scale systems. Salary $405/week. 40 hours per week.

Submit resumes to:
Ivan Reimer,
Personnel
Sperry-Univac
1401 Sixth Avenue South
Clear Lake, Iowa 50428
An Equal Opportunity Employer

Executive Assistant

The Missouri Computer Facilitating Committee, a statewide committee of senior-level administrative officers representing both public and private higher education, is searching for an Executive Assistant to provide leadership in the development and use of computer technologies in Missouri higher education. The Executive Assistant will work with institutions and statewide groups concerned about computer planning; organize statewide forums and demonstrations on computer applications; conduct special studies; and perform other responsibilities assigned by the Computer Facilitating Committee.

Send resume, three letters of references, and statement of interest by June 1, 1980 to: Mr. Robert J. Benson, Chairman — CFC Search Committee, Washington University, Box 1080, St. Louis, Missouri, 63130.

INSTRUCTOR OF MANAGEMENT SYSTEMS

DIAMOND SHAMROCK

We are a major multi-national energy, chemical, technology corporation with annual sales exceeding $2.4 billion, and our internal growth is equally impressive — especially in the data processing area. As a result of this growth, we have an immediate opening for an additional Instructor of Management Systems.

The responsibilities of this position, located in Cleveland, will include developing in-house training courses in the areas of COBOL programming, teleprocessing, data base design and systems analysis; act as tutor for audio visual courses and maintain our instruction room and educational materials. Other duties include instruction of all technical data processing courses, programming, systems design and job control language.

The selected candidate should have a Bachelor's degree in computer science or management information systems plus 4 or more years of experience either as an instructor of systems/programming or hands on computer experience. Knowledge of or experience with the following: COBOL, structured programming, IMS Batch and teleprocessing, TSO/ROSCOE, OS/MVS JCL and utilities, and knowledge of MARK IV is a plus but not mandatory.

You'll find that our salary is competitive, and that we have an excellent benefit package including a comprehensive relocation program. Get in touch with us today and learn more. For immediate consideration, please, contact:

John Keating
Employment Representative

Diamond Shamrock
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DATA PROCESSING

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SYSTEM ANALYSTS (1 Business & 1 Scientific)
Must have excellent communications skills, BS or advanced degree, one or more years as analyst with minimum 4 years programming using COBOL or FORTRAN.

PROGRAMMER ANALYST
BS degree with approximately 4 years programmer experience, or Associate degree and 5 years experience.

SENIOR PROGRAMMER
BS and 2 years experience or Associate degree and 3 years programming.
Permanent positions with excellent benefits and opportunities.

Send resume to Dept. JVJ

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P.O. Box 1149
Montrose, CO 81401

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FACULTY POSITION IN BUSINESS DATA PROCESSING

The Data Processing Department welcomes applications for a faculty position available September 2, 1980. A Bachelors degree required, Masters preferred. Three years business data processing experience is required. Requires strong interest in undergraduate instruction and ability to teach courses in several of the following areas: Systems Analysis, Programming Languages, Teleprocessing, and Data Base Management. **Send complete resume to Professor Stuart J. Travis, Head, Department of Data Processing, Ferris State College, Big Rapids, MI 49307.**
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DATA PROCESSING MANAGER

Live and work in beautiful, sunny San Diego. Growing firm needs someone with minimum 5 yrs. experience in EDP management plus excellent human relations skills. Will be directly responsible for the planning, coordination and direction of the keypunch, programming and computer operations departments (approx. 35 people). Present equipment is IBM System 3. Please send resume and salary requirements to:

Personnel Director
Room 105
5480 PorTecho Court
San Diego, CA 92124
an equal opportunity employer

Word Processing Professionals

Join NCR's New Development Team In Columbia, South Carolina

NCR's New Word Processing Development Group located in Columbia, South Carolina is currently seeking key individuals to provide leadership in the development of office information systems.

These positions are immediately available and require the following experience.

OFFICE INFORMATION SYSTEMS ENGINEER

Requires an individual who will provide the technical focal point and leadership for all aspects of NCR's office information systems architecture, systems design, and product definition. Reporting to the Manager of Word Processing Development, you will work closely with Corporate Product Management to identify key relationships among product lines, and express them in strategies guiding future product evolution. The ultimate goal is to provide a coherent family of products that integrate as many office functions as possible. Requires 8-10 years experience in total systems design with small business systems and a strong hardware/software background that includes systems architecture, distributed data processing, communications, data base, and terminal systems. Knowledge of word processing equipment a plus.

PROJECT LEADER WORD PROCESSING APPLICATIONS SOFTWARE

This individual will lead the applications software group in the development of software modules, word processing text editors, and architectural definition of word processing products. Requires experience in management and implementation of complex software systems and word processing systems, plus a detailed knowledge of data structures and text editing techniques.

MARKETING SUPPORT REPRESENTATIVE

The qualified candidate will be involved in the definition of the operator interface, writing documentation and establishing training programs for our new word processing systems. This will include keyboard layout, feature prioritization screen format, feature design trade-offs, and participation in systems level testing. The position requires 5-10 years experience in the field of word processing including the creation of user/operator documentation, training and sales in environments such as legal, insurance, and hospital users.

■ ■ ■

These are highly visible positions throughout NCR and offer upward mobility within the organization. For prompt consideration, send resume to D50 Ken Uhlig, Word Processing Development, Dept., 3325 Platt Springs Road, West Columbia, South Carolina 29169.

NCR
Complete Computer Systems

An Equal Opportunity Employer

ANALYST/PROGRAMMER

We are seeking individuals to join our expanding systems development staff at our corporate headquarters in the Washington DC area. Responsibilities include systems analysis, systems design and program development. Special consideration will be given to applicants currently using structured analysis/design techniques.

Applicants should be technically proficient in one or more of the following areas: ANSI/COBOL, PL/I, IMS DB/DC, TSO, ACP, and have at least 2 years applicable experience.

USAir (formerly Allegheny Airlines) is the sixth largest domestic passenger airline. Our attractive benefits package includes company paid health insurance, dental plan and retirement, plus liberal travel benefits.

If you are interested in joining a progressive and growing company, please send a letter or resume, including salary history, in confidence to:

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Opportunities Nationwide with State of the Art Systems for:

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- Programmers

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Employment Service/P.O. Box 19949,
Dept. 249/Houston, Texas 77024/713-496-6100

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Computer Professionals

Immediate openings with ITT Federal Electric Corporation in support of the Air Force Western Space & Missile Center located in Santa Barbara County (California). If you join us, you'll apply technology that's not only state-of-the-art, but often a few steps ahead of the techniques and methods used in industry. You'll also see the results of your work—in test activities vital to our nation's security.

OFF THE JOB

. . . you'll enjoy the advantages of a safe, clean, and friendly community. A moderate climate that lets you enjoy outdoor activities all year long. A reasonable cost-of-living. In short, you'll discover the exciting world of the Central California coast.

ON THE JOB

Programmers & Systems Analysts

Professional positions are immediately available at all levels for candidates with BS in a technical discipline (Computer Science, Math, Engineering). Experience with DEC PDP 11 series, VAX 11780, SEL 32/55/75, IBM 360/370, IBM 4300, or CYBER 170 series desirable. Background in structured design techniques a strong plus. S-FORTRAN, FORTRAN, and/or Assembler language experience desirable. Will participate in the development of real-time or non-realtime systems in the state-of-the-art interactive environment.

Data Base Applications

Degree or equivalent required and either actual experience with data base design, GENS, security and recovery or 2 or more years experience in data base applications (DL/I, ADABAS, IDMS, etc.) with the desire to become a data base administrator. Systems design and COBOL programming experience are required and some Assembly language programming is desirable.

Send resume and salary history to Tony Rodriguez, Dept. CW-55, ITT Federal Electric Corporation, P.O. Box 1858, Vandenberg AF Base, California 93437.

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ITT

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General Manager

Computer Services Company

A most unusual opportunity exists in MEMPHIS for a Manager with a strong computer systems background and a flair for business.

Our client has an excellent reputation, viable products, good people, and a first-rate Corporate Management team with the resources and the know-how to maintain rapid growth and profitability. The missing ingredient is a General Manager with sufficient technical, marketing, and business management ability to make it happen. The successful candidate will have a proven track record of management in a State-of-the-Art computer systems environment and a strong profit orientation.

MEMPHIS, located in the sun belt of the New South, is a unique place to live and raise a family, and offers exceptional bargains in well constructed homes. It offers the cultural activities of a city with the convenience and advantages of a small town. An excellent compensation package and relocation assistance is available.

We are consultants to management. For confidential consideration, please send resume and salary history to: James A. Cox, Professionals for Computing, Inc., One Maritime Plaza — Suite 1350, San Francisco, CA 94111. (415) 956-7120. Employer assumes fee.

professionals for computing, inc.

Search and Personnel Services

SENIOR SYSTEMS PROGRAMMER

Eastern Associated Coal Corp., a 400 million dollar energy company, is in the process of developing on-line, real time data base applications to support a variety of business and scientific user needs.

We are seeking a technically-oriented individual with a sound knowledge of computer hardware and the installation and maintenance of operating system software, communications software, and software products. Experience with DBMS would be helpful.

Familiarity with both IBM (OS/VS1, CICS, SPM-II, BAL, Utilities) and Honeywell (GCOS, DMIV-TP, TSS, GMAP, Utilities) would be a definite plus.

B.S. degree in Computer Science or related field and a minimum of 5 years experience as a Systems Programmer preferable. We offer a competitive benefits package and salary structure commensurate with experience.

Please submit resume, including salary history and requirements, to:

Director-MIS
EASTERN ASSOCIATED COAL CORP.
Koppers Building
Pittsburgh, PA 15219

An Equal Opportunity Employer M/F

SUNY Two-Year College Data Processing Faculty

Position available for Fall 1980. Masters preferred, teaching/industrial experience desirable. Knowledge of extended Basic, RPG, Fortran, Cobol, Systems/Assembly. **For info/application write before May 15, 1980 to: Mr. Fred Smith, Business Division Chairperson, State University Agricultural & Technical College, Cobleskill, NY 12043. EO/AA Employer.**

DIRECTOR OF OPERATIONS

Computer Services and Microform Manufacturing

We are an established Washington, D.C.-based information publisher recognized within the information industry and the academic community as a dynamic and innovative leader in the field of information publishing.

A new management position—reporting to the Executive Vice President and Chief Operating Officer—now exists combining computer operations and manufacturing. The ideal candidate will be a highly motivated self-starter and will have management experience in computer operations, systems development, and technical support. We will also look for manufacturing experience—preferably in computers or related hardware. A Bachelor's degree in business, computer science, or math is necessary together with a demonstrated balance between technical competence and management ability.

Immediate responsibilities for computer operations include supervising batch processing operations for editorial, financial, marketing, and administrative needs. Manufacturing responsibilities center on a 60-person microfiche production facility headed by a plant manager. Experience in microfiche manufacturing is helpful but not necessary.

Long-term responsibilities include planning for conversion to an on-line, text-editing system and continued awareness of the technology of fully searchable, online database systems and the combination of digital and micrographic technology.

This position offers an attractive compensation package and excellent company benefits. If you have a record of success, you are invited to submit your resume, salary history, and a letter of inquiry to:

Personnel Manager • P.O. Box 30056 • Washington, D.C. 20014

An Equal Opportunity Employer M/F

TECHNICAL SERVICES MANAGER

Immediate opening in the beautiful northwest offers a unique challenge, visible rewards and recognition in the dynamic growth of a large scale IBM 3033 computer installation for a results oriented Systems Software Manager. Must have at least a bachelor's degree in an appropriate discipline and four years of managerial experience in data processing. This is a policy level position that will participate in all facets of computer center management. Position has direct responsibility for a highly qualified, professional systems software staff in their efforts to implement and maintain state-of-the-art technology in both hardware and software, (i.e., the MVS operating system, a data base management system, and a large and growing teleprocessing network).

Beginning compensation is the low to mid 30's, depending on qualifications. Qualified applicants should submit resumes in confidence by May 9, 1980 to:

CW Box 2277
375 Cochituate Rd., Rte 30
Framingham, MA. 01701

EXECUTIVE DIRECTOR FOR COMPUTER NETWORK

The New Jersey Educational Computer Network (NJECN) is seeking a highly qualified individual to serve as the chief executive officer of the corporation. The NJECN is a cooperative organization of public and private institutions of higher education providing academic and administrative computer services primarily to the educational community. The projected 1980-81 annual budget for the network is about four million dollars. It is desired that applicants for the position possess an advanced degree with a strong background in computer sciences and broad experience in managing computer resources. The network operation is currently located on and near the campus of Rutgers University, New Brunswick. Salary is in the $40,000 range and is negotiable depending on experience. Inquiries, nominations, and resumes and salary requirements should be sent no later than June 6, 1980 to:

ATTENTION: NJECN SEARCH COMMITTEE
Dr. Seymour C. Hyman, President
The William Paterson College of New Jersey
Wayne, New Jersey 07470

"NJECN is an Equal Opportunity Employer"

UNIVERSITY OF WISCONSIN SYSTEM

DIRECTOR, COMPUTER SERVICES COOPERATIVE

The University of Wisconsin System is seeking a director for the Computer Services Cooperative. The Computer Cooperative provides data processing services for UW-System Administration, UW-Extension and UW-Center System.

The Director reports to a Board of Directors and is responsible for the organization, staffing and operation of the Cooperative.

Essential qualifications include a university degree with at least three years experience in management of a computer installation, as well as experience in a teleprocessing environment and systems programming.

Salary is related to experience and educational background.

Position available July 1, 1980.

A position description and additional information are available. Qualified applicants may send a resume and the name, address, and telephone number of at least three references, by June 1, to Mr. Michael McLain, UW-Extension, 432 North Lake Street, Madison, Wisconsin 53706, (608) 263- 5031.

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DATA PROCESSING PROFESSIONAL

Excellent supervisory opportunity for an individual with programming background in the following disciplines:

- **IBM System 3, Model 15 D**
- **R.P.G. II**
- **C.C.P.**

College background preferred with demonstrated supervisory capabilities. Salary commensurate with experience. Excellent company paid benefits. Send resume to Vice-President, Industrial Relations:

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Plus free accommodation, re-location, transportation, medical insurance, etc.

ARABIAN DATA SYSTEMS, a Management Sciences/Data Processing Consultancy Company have their H.Q. in Jeddah. The Company are working on a number of projects, the largest of which is the International Airports Project which is based on IBM 3031 and 370/148, running under OS/VS1, using ADABAS and COMPLETE, and a variety of minis and micros. For this project Arabian Data Systems have been retained by the International Airports Authority to build the Management Information and Operational Systems, and to run the D.P. Centre on a facilities management basis.

The Company requires additional staff for the International Airports Project, and for other major developments which include Banks, Universities and large commercial concerns. The Company are looking for staff of different nationalities, but for one project in particular it is essential to be Arabic speaking, or to be a Moslem.

Jenny Dalrymple-Hay will be in the U.S.A. and Canada from 4th June. If you are interested in these opportunities, please send resumes as soon as possible to the London address in order that interviews can be arranged in advance. Urgent responses can be telexed to London 924356 (answer back NCLDNG). Please quote Ref. 9805.

PROJECTS DIRECTOR

To co-ordinate projects, carry out audits on existing developments, oversee the presentation of proposals and tenders, and where necessary be responsible for recommending and building project teams and managing initial stages of project developments.

PLANNING MANAGERS

To handle specific market areas, i.e. Banking, Airlines, Airports. Top level Consultants/Managers to handle existing and new projects by undertaking feasibility studies, and carrying out investigations into organizations, present operations and data processing activities. Applicants must be specialists in their area and must be capable of making far reaching recommendations for new systems structures, hardware and software, and managing subsequent developments and implementations.

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To work as members of the Company's Planning Department, to evaluate and select hardware and software for specific requirements (i.e. Flight Display, facilities for the Airport Project, Cash Dispensing for Banks, etc.) To be responsible for analyzing requirements, recommending and implementing solutions, interfacing with the development teams, and where necessary being responsible for development and implementation.

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To work on the analysis, design and specification of administration and control systems for the Airports Project, i.e. Document Control, Micrographics, Financial Control, etc.) To carry out studies into organizational structures for new projects. To work on various systems activities associated with other projects.

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DATA BASE ADMINISTRATORS

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The Center provides services to a wide range of Government Departments with applications ranging from scientific research to financial and administrative systems.

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The person we seek must have a minimum of a Bachelors of Science degree in Electrical Engineering along with 4 years experience in the job being offered or 7 years in Installation Operations. In addition, this person must have professional competence supported by knowledge and experience of switching systems, extensive familiarity with installation practices, customer procedures, and operations as well as maintenance of central office switching equipment.

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Software Engineer

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Software Engineer

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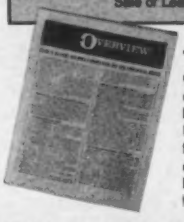

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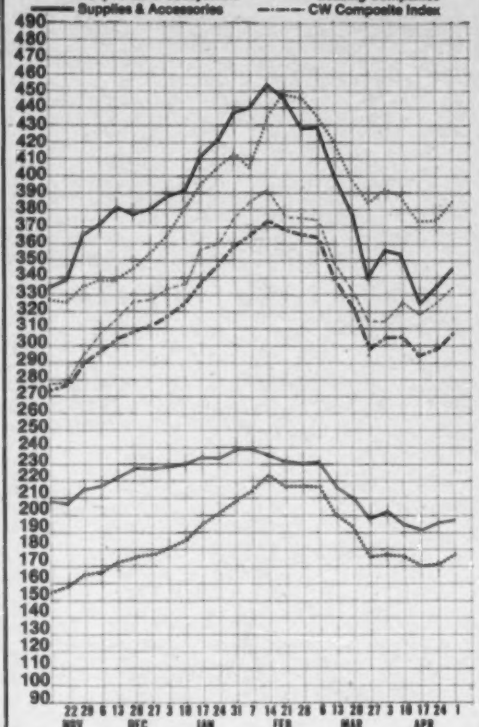

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Computerworld Headquarters
375 Cochituate Road
Framingham, Mass. 01701
Phone: (617) 879-0700
Telex: 95-1153

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COMPUTERWORLD
375 Cochituate Road
Framingham, Mass. 01701
Phone: (617) 879-0700
Telex: 95-1153

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Susan Wolffe
Account Coordinator
COMPUTERWORLD
375 Cochituate Road
Framingham, Mass. 01701
Phone: (617) 879-0700
Telex: 95-1153

NEW YORK
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Eastern Regional Director
Peter Senft
District Manager
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Candy Kelly
Account Coordinator
COMPUTERWORLD
Paramus Plaza I
140 Route 17 North
Paramus, N.J. 07652
Phone: (201) 967-1350

CHICAGO
Thomas H. Knorr, Jr.
District Manager
Jane Wrightman
Account Coordinator
COMPUTERWORLD
230 North Michigan Avenue
Chicago, Ill. 60601
(312) 782-7565

LOS ANGELES
Jim Richardson
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Kathie Knox
Account Coordinator
COMPUTERWORLD
3420 Ocean Park Boulevard
Suite 3020
Santa Monica, Calif. 90405
Phone: (213) 450-7181

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Account Manager
Bob Stetson
Account Manager
Ruth Gordon
Account Coordinator
COMPUTERWORLD
353 Sacramento Street
Suite 600
San Francisco, Calif. 94111
Phone: (415) 421-7330

JAPAN
Mr. Shigema Takahashi
General Manager
DEMPA/COMPUTERWORLD
1-11-15 Higashi Gotanda
Shinagawa-ku, Tokyo 141
Phone: (03) 445-6101
Telex: J2424461

UNITED KINGDOM
Steve Burton
IDG PUBLISHING LTD.
140-146 Camden Street
London NW1 9PF
Phone: (01) 267-1201
Telex: UK-264737

Euan C. Rose
BEERE, HOBSON ASSOCIATES
34 Warwickshire Kenilworth
Warwickshire, CV8 1HE
Phone: (0926) 57619
Telex: UK-311951

WEST GERMANY
Eckhard Utpadel
CW PUBLIKATIONEN
Fredrichstrasse 31
8000 Munich 40
Phone: (089) 34-90-61
Telex: W.Ger-5-215250-HKFD

AUSTRALIA
Alan Power
COMPUTERWORLD PTY. LTD.
37-43 Alexander St.
Crows Nest, NSW 2065
Phone: (02) 439-5133
Telex: SECCO AA25466

BRAZIL
Eric Hippeau
COMPUTERWORLD do BRAZIL
Servicos e Publicacoes Ltda.
Rua Alcindo Guanabara
25/10th floor
20031 Rio de Janeiro, RJ
Phone: (021) 240-8225
Telex: 11-32017 (WORD BR)

MEXICO
Kevin Kellegham
COMPUTERWORLD de MEXICO
Oaxaca 21-2
Colonia Roma
Mexico City 7 D.F.
Phone: (905) 514-4218
(905) 514-4309

TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, APRIL 30, 1980

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

EXCH		1979-80 RANGE (1)	CLOSE APR 30 1980	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
A	AMDAHL CORP	16- 49	18 5/8	+ 5/8	+3.4
N	BURROUGHS CORP	59- 87	64 3/4	-1 1/4	-1.8
O	COMPUTER AUTOMATION	9- 41	16 1/4	+1 1/4	+8.3
N	CONTROL DATA CORP	23- 61	52	- 3/8	-0.7
O	CRAY RESEARCH INC	8- 58	45 3/4	+3 3/4	+8.9
N	DATA GENERAL CORP	42- 74	61 5/8	+3 7/8	+6.7
N	DATAPOINT CORP	17- 62	58 1/4	+1 3/4	+3.6
N	DIGITAL EQUIPMENT	39- 80	64 1/2	+1 5/8	+2.5
N	ELECTRONIC ASSOC.	2- 13	7 3/8	- 1/8	-1.6
A	ELECTRONIC ENGINEER.	9- 19	14 1/8	- 1/8	-0.8
N	FOUR-PHASE SYSTEMS	19- 47	19 5/8	+2 5/8	+11.7
N	FOXBORO	29- 44	32 5/8	- 3/8	-1.1
O	GENERAL AUTOMATION	7- 24	7 7/8	- 3/8	-4.5
O	GRI COMPUTER CORP	1- 3	1 1/2	0	0.0
N	HEWLETT-PACKARD CO	24- 78	57 1/2	+1 3/8	+2.4
N	HONEYWELL INC	43-108	74 1/2	+1 3/4	+2.4
N	IBM	51-321	54 7/8	+1 3/8	+2.5
N	MANAGEMENT ASSIST	9- 29	12 1/8	+2 1/2	+25.9
O	MANUFACTURING DATA S	9- 38	29 3/4	- 1/4	-0.8
O	MINI-COMPUTER SYST	2- 8	2 3/4	+ 1/4	+10.0
O	MODULAR COMPUTER SYS	7- 18	12 1/2	+1 7/8	+17.6
N	NCR	37- 81	54	- 1/2	-0.9
N	PRIME COMPUTER INC	9- 32	18	0	0.0
N	PERKIN-ELMER	17- 47	39 1/4	+ 3/4	+1.9
N	SPERRY RAND	33- 69	47	+2 3/4	+6.2
A	SYSTEMS ENG. LABS	11- 24	16 3/8	+ 1/2	+3.1
O	TANDEM COMPUTERS INC	13- 94	46 1/2	+2	+4.4
N	TEXAS INSTRUMENTS	70-108	85 3/8	+1 7/8	+2.2
A	WANG LABS.	6- 40	33 1/2	+2 7/8	+9.3
	LEASING COMPANIES				
O	BOOTHE FINANCIAL CP	13- 21	15 1/2	+1	+6.8
O	COMDISCO INC	13- 21	9 3/8	+ 3/4	+8.4
A	COMMERCE GROUP CORP	1- 2	1 1/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 7	1 7/8	0	0.0
O	CONTINENTAL INFO SYS	2- 15	2 1/4	- 1/4	-10.0
N	DATRONIC RENTAL	1- 4	2 1/2	0	0.0
A	DCL INC	3- 6	5	0	0.0
N	DPF INC	5- 14	6 3/8	+ 7/8	+15.9
N	ITEL	2- 36	3	+ 1/2	+20.0
N	LEASCO CORP	24- 73	62 1/2	+1 1/4	+2.0
O	LEASPAC CORP	1- 4	1/8	0	0.0
A	PIONEER TEX CORP	2- 7	2 3/4	- 1/8	-4.3
N	U.S. LEASING	12- 29	12 7/8	0	0.0
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 3	2 3/8	- 1/8	-5.0
O	ANACOMP INC	8- 24	12 1/2	+ 1/2	+4.1
O	ANALYSTS INTL CORP	3- 6	4 1/4	+ 1/4	+6.2
A	APPLIED DATA RES.	7- 17	8 1/2	- 1/4	-2.8
N	AUTOMATIC DATA PROC	24- 40	37 1/8	+ 3/8	+1.0
O	COMPU-SERV NETWORK	5- 19	18 3/4	+ 1/2	+2.7
O	COMPUTER HORIZONS	1- 9	3 1/4	0	0.0
O	COMPUTER NETWORK	4- 16	5 1/8	+ 1/2	+10.8
N	COMPUTER SCIENCES	8- 24	20	+ 3/4	+3.8
O	COMPUTER TASK GROUP	1- 9	4 1/4	+ 1/4	+6.1
O	COMPUTER USAGE	2- 5	3 1/8	- 1/8	-3.8
O	COMPUT AUTO REP SYC	4- 10	6 5/8	- 1/8	-2.6
O	COMSHARE	9- 26	13 1/2	+2 1/4	+20.0
O	CULLINANE CORP	14- 34	33 1/2	+4	+13.5
O	DATA DIMENSIONS INC	1- 9	1 1/8	0	0.0
O	DATATAB	1- 4	1 1/8	0	0.0
O	DSI CORP	4- 9	6 1/2	0	0.0
N	ELECTRONIC DATA SYST	15- 28	23	+1 7/8	+9.0
O	INFORMATICS INC	9- 22	12 3/4	- 1/4	-1.9
O	INSYTE CORP	1- 3	1 5/8	0	0.0
O	IPS COMPUTER MARKET.	2- 4	3	0	0.0
O	KEANE ASSOCIATES	3- 9	6 1/4	- 1/4	-3.8
O	KEYDATA CORP	1- 5	2 1/4	+ 1/4	+12.5
A	LOGICON	10- 23	17	- 1/4	-1.4
O	NATIONAL DATA CORP	7- 19	16 5/8	+1 5/8	+8.9
N	PLANNING RESEARCH	4- 10	5 5/8	+ 1/8	+2.2
O	PROGRAMMED TAX SYSTS	3- 5	4 7/8	0	0.0
O	PROGRAMMING & SYS	1- 1	5/8	0	0.0
O	RAPIDATA INC	3- 7	4 7/8	- 3/8	-7.1
O	REYNOLDS & REYNOLD	18- 36	24 3/4	- 1/4	-1.0
O	SCIENTIFIC COMPUTERS	3- 16	13	+ 1/4	+1.9
N	TYMSHARE INC	18- 58	47 1/4	+3	+6.7
A	URS SYSTEMS	5- 12	10 1/4	+1 1/8	+12.3
N	WYLY CORP	1- 9	7 5/8	+ 1/2	+7.0
	PERIPHERALS & SUBSYSTEMS				
N	AM INTERNATIONAL	13- 32	16 1/2	+ 3/8	+2.3
N	AMPEX CORP	10- 29	19	+1 3/4	+10.1
A	ANDERSON JACOBSON	5- 16	10 3/8	- 3/8	-3.4
N	APPLIED DIG DATA SYS	5- 22	6 1/4	+ 1/8	+2.0
O	AUTO-TROL TECHNOLOGY	14- 39	29 1/4	+1 1/4	+4.4
O	BERKIVE INT'L	3- 8	7 1/4	+1 1/2	+26.0
A	BOLT,BERANEK & NEW	6- 22	18	+ 7/8	+5.1
N	BUNKER-RAMO	19- 32	24 3/8	+ 1/8	+0.5
O	CAMBRIDGE MEMORIES	1- 9	1 3/4	+ 1/4	+16.6
O	COMPUTER DEVICES INC	5- 9	4	+ 1/8	+2.1
N	CENTRONICS DATA COMP	10- 54	26 3/8	+ 7/8	+3.4
O	COGNITRONICS	1- 4	2 3/4	0	0.0
O	COMPUTER COMMUN.	4- 10	3 7/8	- 1/8	-3.1
O	COMPUTER CONSOLES	4- 29	11	+ 1/2	+4.7
A	COMPUTER EQUIPMENT	3- 7	5	0	0.0
O	COMPUTER TRANSCEIVER	1- 5	2 1/8	0	0.0
O	COMPUTERVISION CORP	5- 58	45 1/4	-1 5/8	-3.4
N	CONRAC CORP	13- 26	17 5/8	+ 5/8	+3.6
	DATA ACCESS SYSTEMS	8- 14	10 3/8	+ 7/8	+9.2
A	DATA PRODUCTS CORP	12- 25	12 1/8	- 7/8	-6.7
O	DATUM INC	2- 6	2 1/4	+ 1/8	+5.8
O	DECISION DATA COMPUT	2- 6	2 1/2	+ 1/4	+11.1
O	DELTA DATA SYSTEMS	1- 3	1 5/8	- 1/8	-7.1
N	DOCUMATION INC	6- 34	9	- 1/8	-1.3
O	DATARAM CORP	6- 37	35 1/4	+3	+9.7
N	ELECTRONIC M & M	3- 9	3 3/4	0	0.0
O	EVANS & SUTHERLAND	10- 27	27	+4	+17.3
O	FABRI-TEK	1- 2	1 7/8	+ 1/8	+7.1
O	GENERAL COMPUTER SYS	1- 3	2 1/4	- 1/8	-5.2
O	GENERAL DATACOMM IND	9- 24	13 3/4	+ 1/4	+1.8
N	HAZELTINE CORP	10- 29	22 1/4	+ 1/8	+0.5
N	HARRIS CORP	17- 38	31 7/8	+1	+3.2
O	INFOREX INC	1- 11	1 1/4	+ 1/4	+25.0
O	INFORMATION INTL INC	7- 15	10 3/4	- 1/4	-2.2
O	INFOTON	1- 4	2	0	0.0
O	INTEL CORP	26- 75	61 1/4	0	0.0
O	INTERSIL	7- 32	19	+2 7/8	+17.8
A	LUNDY ELECTRONICS	4- 11	8 5/8	+ 1/2	+8.1
O	MSI DATA CORP	5- 19	6 1/4	+ 1/8	+2.0
N	MEMOREX	11- 59	12	- 1/2	-4.0
N	MOHAWK DATA SCI	6- 20	14 1/2	+ 3/8	+2.6
O	OMEX	2- 10	9	-1	-10.0
O	PARADYNE CORP	9- 36	23 1/2	+1 1/8	+5.0
A	PENRIL CORP	5- 15	11	+ 1/4	+2.3
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	RANTEK CORP	7- 17	10 3/4	- 1/2	-4.4
O	RECOGNITION EQUIP	5- 13	7 1/8	+ 5/8	+9.6
O	SCAN DATA	1- 5	1 3/8	+	+4.5
N	STORAGE TECHNOLOGY	12- 46	12 3/4	- 1/2	-3.7
O	SYKES DATATRONICS	4- 31	18 1/2	+ 1/2	+2.7
O	T BAR INC	11- 28	17 1/8	-5 3/4	+24.7
A	TEC INC	3- 13	3 3/8	0	0.0
N	TEXTRONIX INC.	33- 64	44 5/8	- 1/4	-0.5
N	TELEX	3- 9	3	0	0.0
O	TESDATA SYSTEMS CP	8- 26	9 3/4	+1	+11.4
O	TIMEPLEX INC	4- 14	10 3/4	+ 1/2	+4.8
O	WILTEK INC	1- 2	1 3/8	+ 5/8	+83.3
	SUPPLIES & ACCESSORIES				
A	AMERICAN BUS PRODS	6- 12	9 5/8	- 1/2	-4.9
O	BALTIMORE BUS FORMS	1- 4	3/4	0	0.0
N	BARRY WRIGHT	14- 34	25	+1 1/2	+6.3
O	CYBERNETICS INC	1- 1	3/4	0	0.0
O	DUPLEX PRODUCTS INC	7- 16	11 3/8	- 1/4	-2.1
N	ENNIS BUS. FORMS	5- 21	15 1/4	+ 5/8	+4.2
N	3M COMPANY	43- 66	52 3/4	+2	+3.9
O	MOORE CORP LTD	26- 36	29	+ 3/4	+2.6
N	NASHUA CORP	18- 37	21 1/2	+ 1/4	+1.1
O	STANDARD REGISTER	20- 29	24 3/4	+ 1/4	+1.0
A	TAB PRODUCTS CO	8- 22	17 1/8	+ 1/8	+0.7
A	WABASH MAGNETICS	10- 22	11 1/2	- 1/8	-1.0
N	WALLACE BUS FORMS	18- 33	24 7/8	+ 1/2	+2.0

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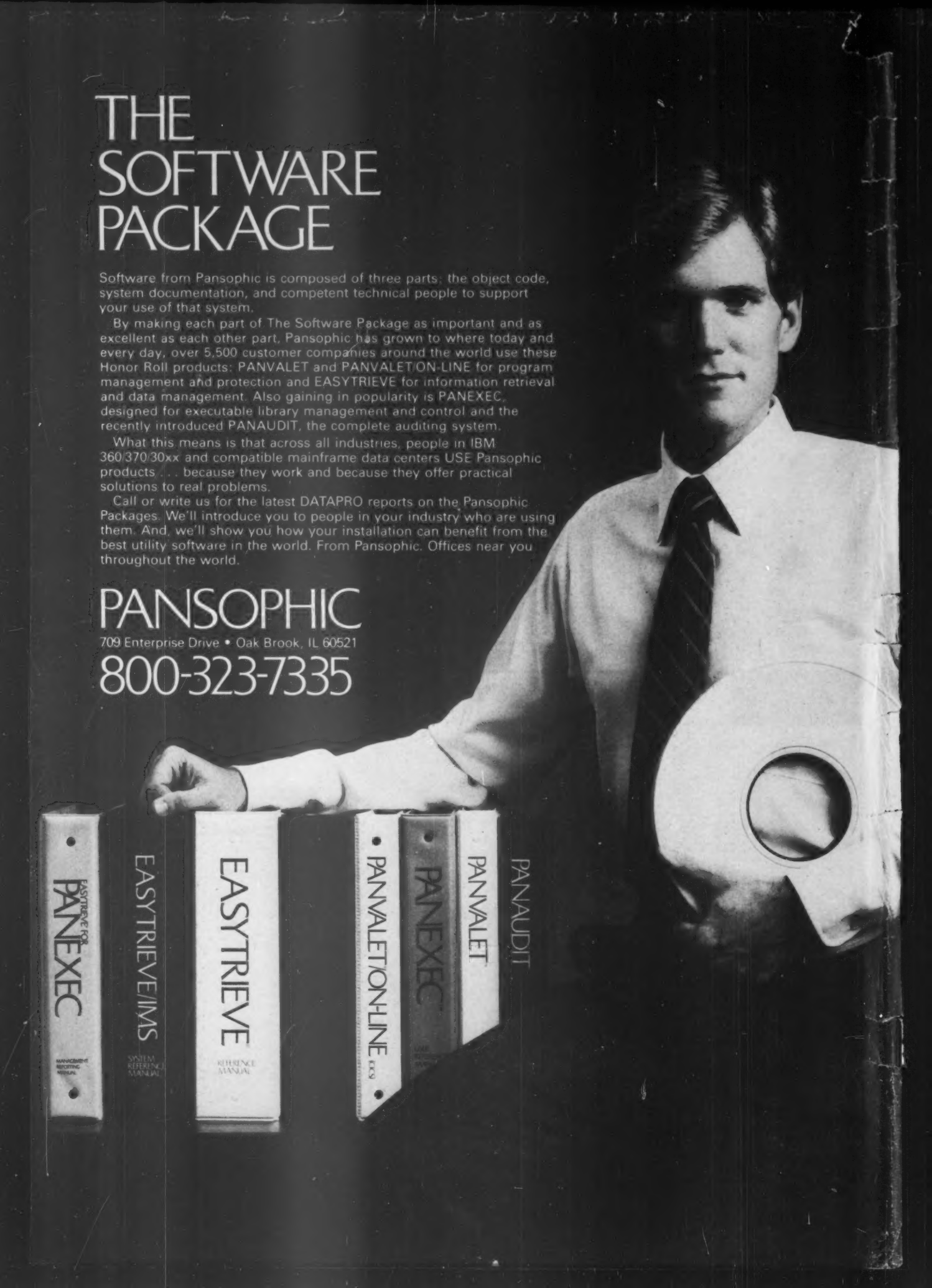
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